commodore power/play

home computing

Winter 1983 Volume II, Number 4
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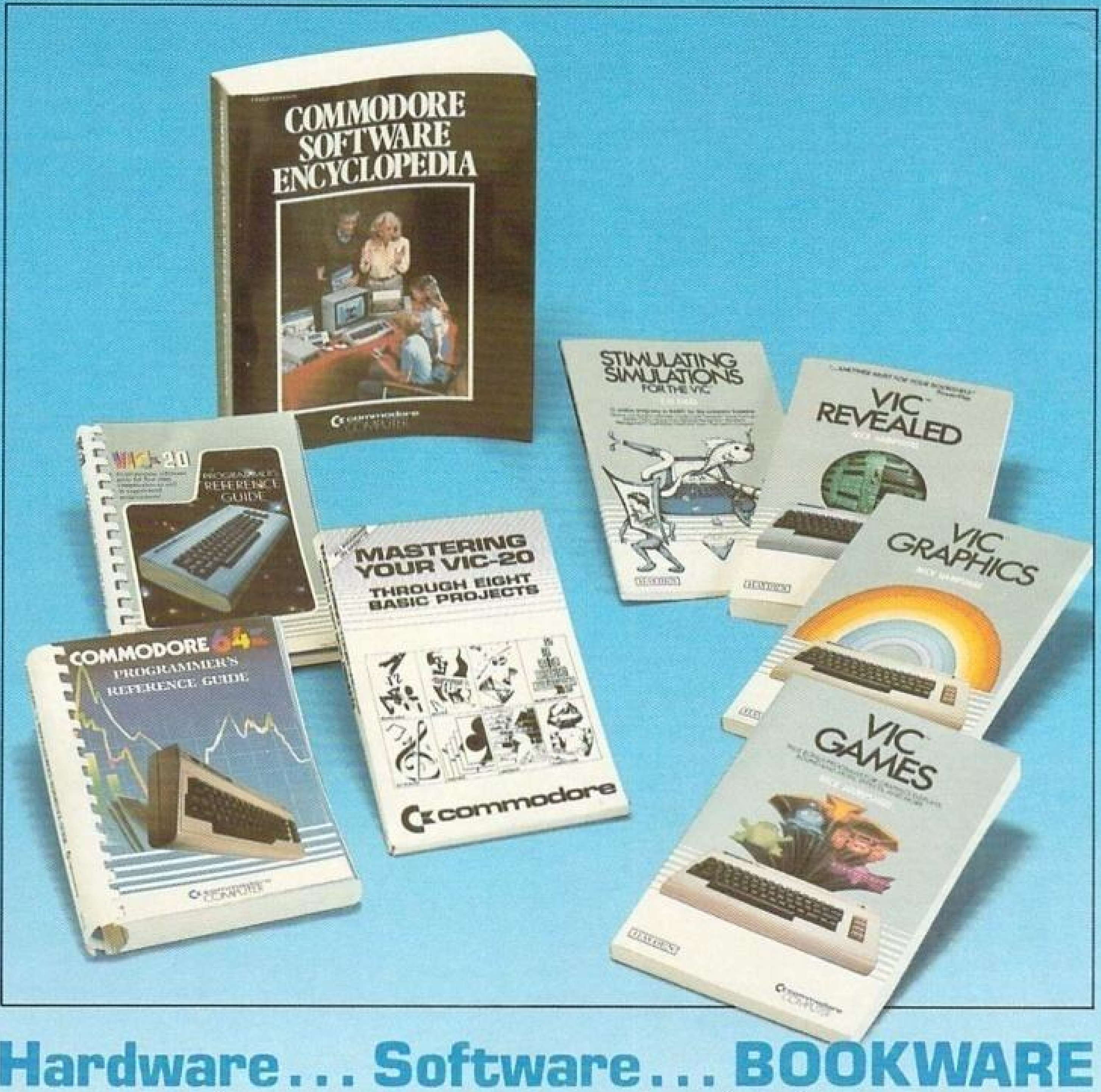
COMMODORE SOFTWARE ENCYCLOPEDIA
VIC-20 PROGRAMMER'S REFERENCE GUIDE
COMMODORE 64 PROGRAMMER'S REFERENCE GUIDE
MASTERING YOUR VIC-20 THROUGH EIGHT BASIC PROJECTS
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VIC REVEALED
VIC GRAPHICS
VIC GAMES

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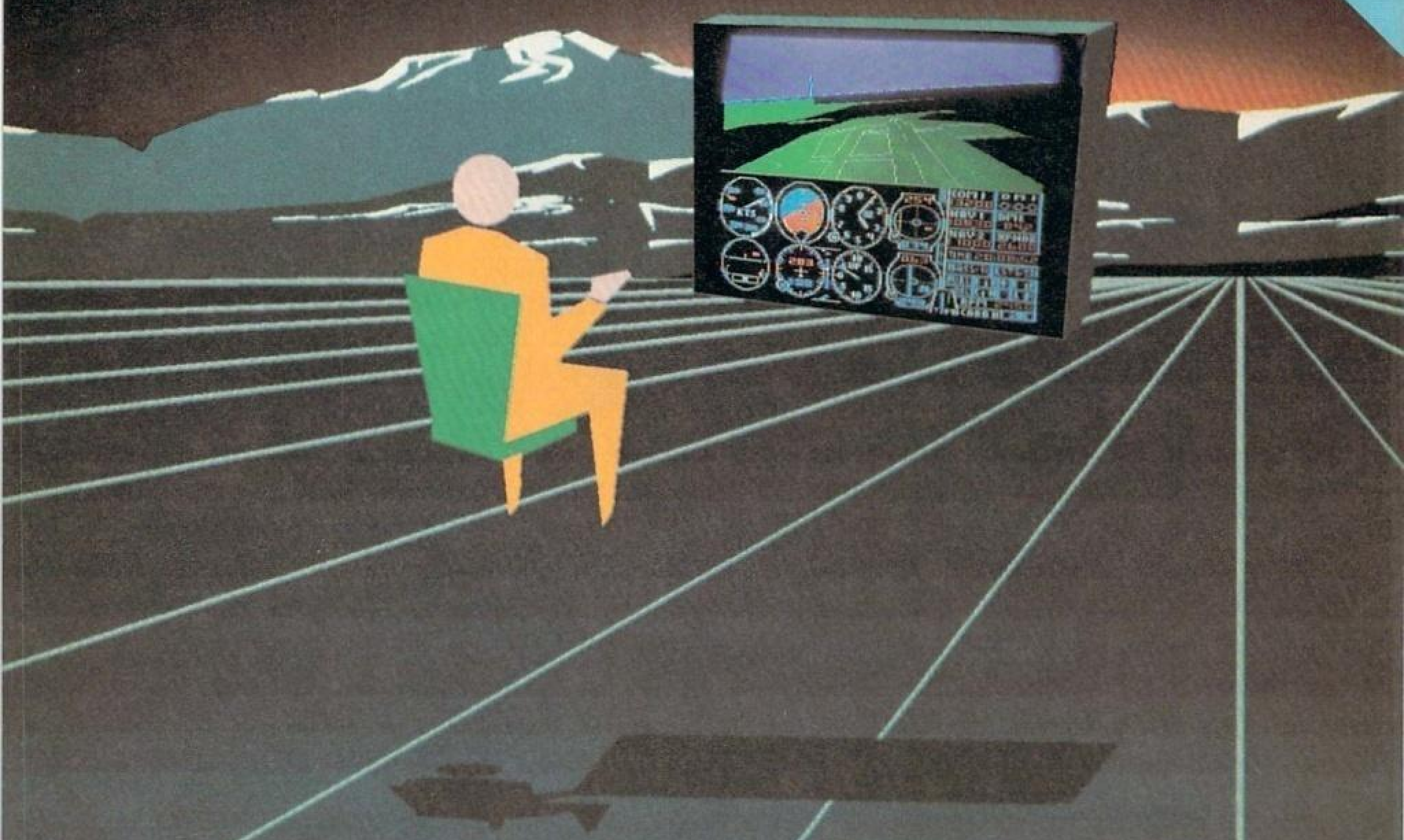
First In Quality Software

Flight Simulator II

For the Commodore 64™



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NEW **Star Post:** Protect the Star Post from waves of invaders. 3 levels of skill. 99 levels of action.

NEW **Avenger:** Destroy attacking aliens with laser cannons. Classic arcade action. Multi-speed attacks.

Jupiter Lander: Space landing simulation. Horizontal/vertical thrust. Soft-land scoring. Wow! animation.

Radar Rat Race: Beat the maze. Eat all the cheese. Beware deadly cats/rats. Cartoon action fun for all ages.

NEW **Lemans:** Multi-obstacle road racing at its best. Arcade action and graphics. Night, water and divided highway hazards.

NEW **Star Ranger:** Fight your way through hoards of space enemies. Avoid asteroids and land safely. Superb graphics and space action.

NEW **Frogmaster:** Unique sports challenge. Train animals to play football and rugby. Over 100 variations. Play against, computer, friend or yourself.

RADAR RAT RACE
PINBALL SPECTACULAR
FROG MASTER
JUPITER LANDER
TOOTH INVADERS
STAR POST
STAR RANGER
LEMANS
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Children's Series

Introduction to Basic I: Simple step-by-step instructions. Modular design. Practical BASIC applications as you learn.

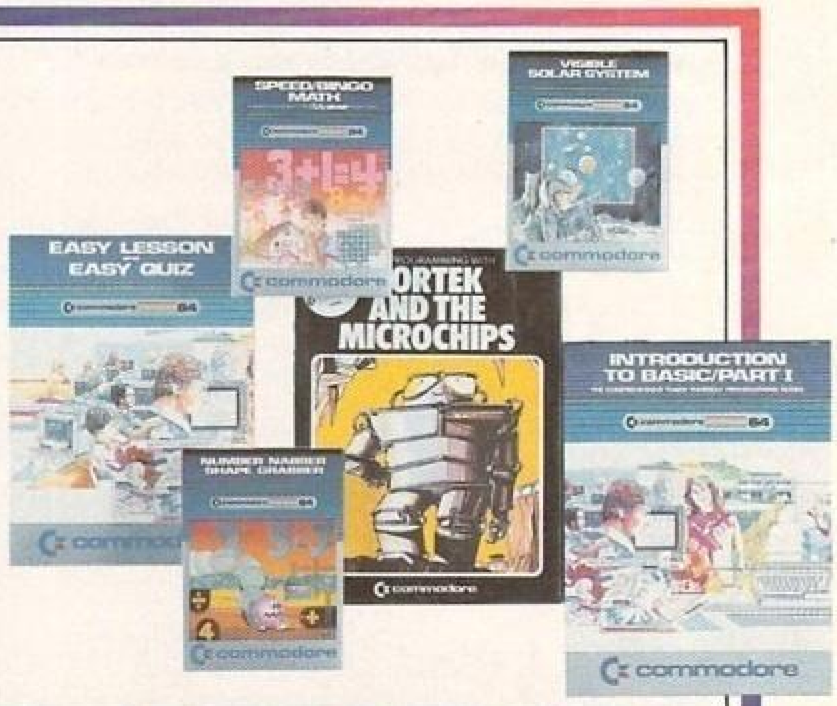
Zortek and the Microchips: Award winning program teaches children BASIC through games, graphics and stories.

Easy Lesson/Easy Quiz: Take the drudgery out of writing tests and quizzes. Answer keys provided. 7 categories per test.

NEW **Number Nabber/Shape Grabber:** 2 Learning games in 1. Build both math and object identification skills. Lively graphic and sound effects.

Visible Solar System: Fly the solar system. Land on planets. Calculate age and weight. Astronomy for home and school. Award winner.

Speed/Bingo Math: 2 games in 1 teach children 4 to 10 basic math skills. Beat the clock or your friends.


SPEED/BINGO MATH
VISIBLE SOLAR SYSTEM
EASY LESSON EASY QUIZ
ZORTEK AND THE MICROCHIPS
INTRODUCTION TO BASIC/PART I
NUMBER NABBER SHAPE GRABBER
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Bally Midway

NEW **Gorf:** 4 Space action games in 1. Fly your fighter defeat "The Empire". Multi-skill levels. IT TALKS! (with Magic Voice)

NEW **Wizard of WOR:** Fight your way through 30+ mazes. Defeat the Wizard and Worriors. Multi-skill. IT TALKS! (with Magic Voice.) Award winning conversion.

Seawolf: The classic battle at sea. Destroy PT Boats and Destroyers. Great graphics and sound.

Omega Race: Fast space race action. Many skill levels. Avoid deadly mines as you eliminate droid forces.

Clowns: Amazing action under the "Big Top". Help clowns "pop" balloons. Colorful acrobatics. Fun for all.

Kickman: Ride the unicycle and catch falling objects. Multi-skill levels. Tuneful sound. Watch out! Don't fall!

NEW **Blueprint:** Help J.J. build the "Ammo Machine". Parts are stored in a colorful maze of houses. Multi-skill and difficulty levels.

NEW **Lazarian:** 4 different screens. Multi-skill level space action. Rescue, evade obstacles and destroy a one-eyed leviathan.

KICKMAN
WIZARD OF WOR
BLUEPRINT
GORF
CLOWNS
LAZARIAN
OMEGA RACE
SEA WOLF
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Adventure Games

Zork I: Fantasy adventure in a dungeon. Find all the treasure and escape alive.

Zork II: This dungeon adventure dares you to find treasure and secret places and still survive.

Zork III: The ultimate dungeon test. Discover the Dungeon Master's secret purpose and come out alive.

Suspended: Awake in 500 years. Solve varied real and original puzzles to save the planet from total destruction.

Starcross: Travel through the mystery ship. Meet aliens friend and foe. Face the challenge of your destiny. Map of galaxy included.

Deadline: Find the murderer and solve the mystery all in 12 hours. Inspector casebook and evidence included.

ZORK I
STARCROSS
DEADLINE
SUSPENDED
ZORK III
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Music Series

Music Machine: Play piano or organ melodies and percussion rhythms together. Music staff shows notes on screen. Vibrato, tempo and pitch controls.

Music Composer: Create, play and save your tunes easily. Simulates up to 9 instruments. Notes appear on screen. Play your keyboard like a piano.

MUSIC MACHINE
MUSIC COMPOSER
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home computing

features

Winter 1983 Volume II, Number 4

New Games

Home Applications

Great Gifts

Give a Commodore Christmas!
33 New Games for the Commodore 64
- **An Instructional Guide to World-Class *International Soccer*** by Steve Finkel
- ***GORF* and *Wizard of Wor*: Talking Games for the 64** by Neil Harris
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64 Making Friends With SID, Part 5 by Paul Higginbottom
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commodore
power/play
home computing

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120 **Tele/Scope**
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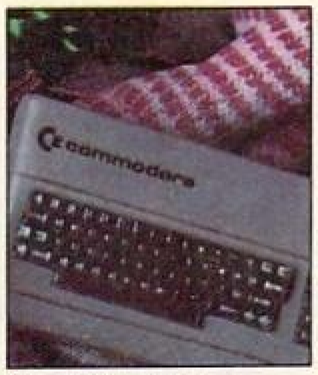
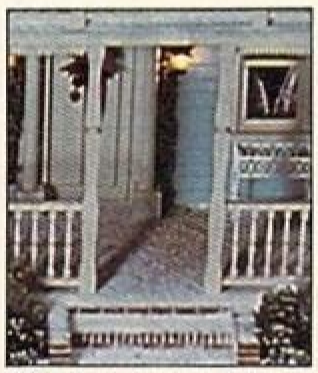

New Hardware


Products

SID, Part 5

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For Your Most Important Computing Needs

Commodore is your best value in practical software—just take a look at the programs shown here—we've got everything from wordprocessing to business accounting, from electronic spreadsheets to computer graphics. Use the Software Selection Guide to find the programs which best meet your needs, then see your Commodore dealer!

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EasyScript 64
Displays 764 lines × 240 characters. Prints to 130 columns. Works with EasySpell 64.

EASY SPELL
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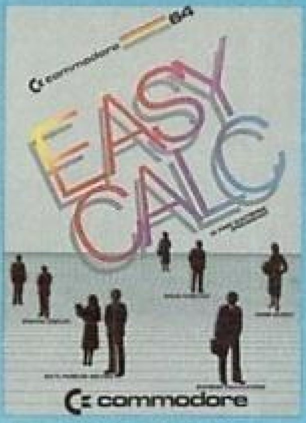
EasySpell 64
20,000 word Master Dictionary and automatic spelling checker. Works with EasyScript 64.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EASY CALC
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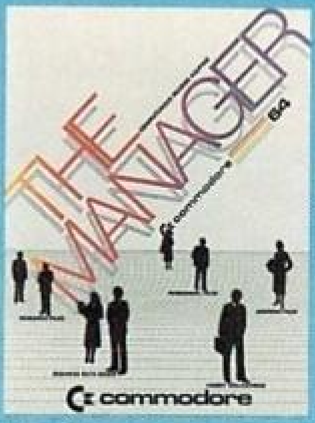
EasyCalc 64
Multiple electronic spreadsheet with color bar graph feature. 63 columns × 254 rows.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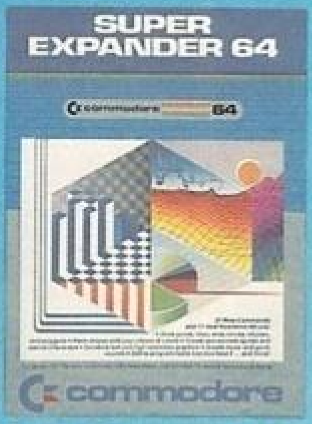
The Manager
Sophisticated database system with 4 built-in applications, or design your own. Text, formulas, graphics.


SUPER EXPANDER 64
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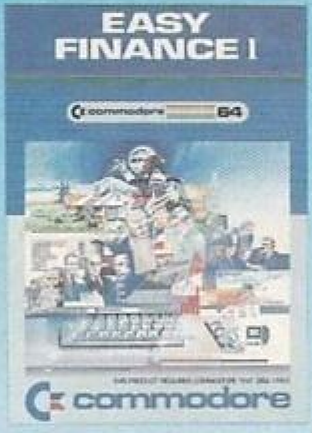
SuperExpander 64
21 special commands. Combine text with high resolution graphics. Music and game sounds.


EASY FINANCE I
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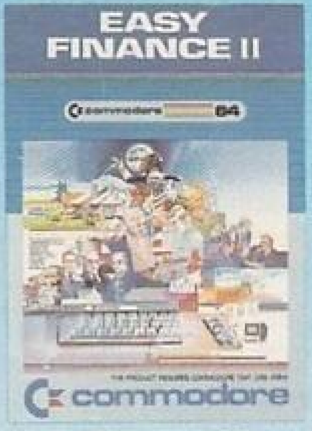
Easy Finance I—Loan Analysis
12 loan functions. Bar graph forecasting as well as calculation.


EASY FINANCE II
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Easy Finance II—Basic Investment Analysis
16 stock investment functions. Investment bar graph.

EASY FINANCE III
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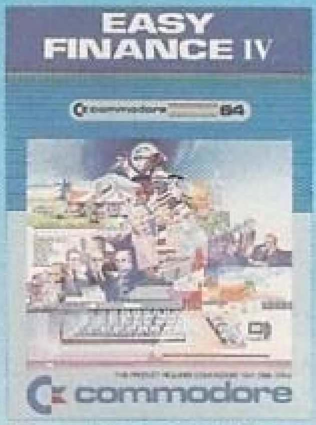
Easy Finance III—Advanced Investment Analysis
16 capital investment functions. Bar graphs.


EASY FINANCE IV
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Easy Finance IV—Business Management
21 business management features. Bar graphs.

EASY FINANCE V
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Easy Finance V—Statistics and Forecasting
Assess present/future sales trends with 9 statistics and forecasting functions.

ACCOUNTS PAYABLE/ CHECKWRITING
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Accounts Payable/Checkwriting
11 functions. Automatic

ACCOUNTS RECEIVABLE/ BILLING
commodore 64
commodore

Accounts Receivable/Billing
11 billing functions. Printed statements.

GENERAL LEDGER
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General Ledger
8 general ledger options. Custom income statement, trial balances, reports.

INVENTORY MANAGEMENT
commodore 64
commodore

Inventory Management
1000 inventory items. Full reports.

PAYROLL
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commodore

Payroll
24 different payroll functions. Integrated with G/L system.

SOFTWARE SELECTION GUIDE

APPLICATION	SOFTWARE
Budget/Calculation	EASYCALC 64
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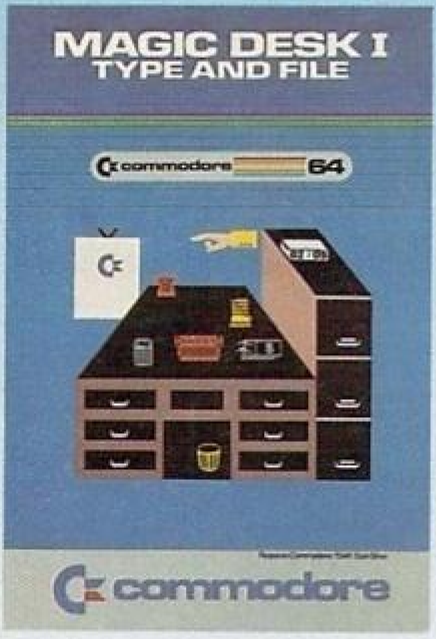
Business Management	EASYFINANCE IV—BUSINESS MANAGEMENT
Children's Programming	ZORTEK & THE MICROCHIPS
Cooking/Recipes	MICRO COOKBOOK
Data Base Management	THE MANAGER
Electronic Spreadsheet	EASYCALC 64
Filing/Recordkeeping	MAGIC DESK, THE MANAGER, INVENTORY MANAGEMENT
Financial Investments	EASYFINANCE II—BASIC INVESTMENT ANALYSIS, EASYFINANCE III—ADVANCED INVESTMENT ANALYSIS, FINANCIAL ADVISOR
Graphics/Sound	SUPEREXPANDER 64
Learn Programming	INTRODUCTION TO BASIC—PART 1
Loans/Mortgages	EASYFINANCE I—LOAN ANALYSIS, FINANCIAL ADVISOR
Mailing List	EASYMAIL 64
Music	MUSIC COMPOSER, MUSIC MACHINE
Programming Aids	SUPEREXPANDER 64, SCREEN EDITOR, ASSEMBLER 64
Reference Books	PROGRAMMERS REFERENCE GUIDE, SOFTWARE ENCYCLOPEDIA
Spelling Dictionary	EASYSPELL 64 (for use with EASYSCRIPT 64)
Statistics/Forecasting	EASYFINANCE V—STATISTICS & FORECASTING, EASYFINANCE IV—BUSINESS MANAGEMENT
Teacher's Aids	EASYLESSON/EASYQUIZ, LOGO, PILOT
Telecommunications	VICMODEM, AUTOMODEM, TERM 20/64, RS232 INTERFACE
Wordprocessing	EASYSCRIPT 64, MAGIC DESK, WORD MACHINE/NAME MACHINE



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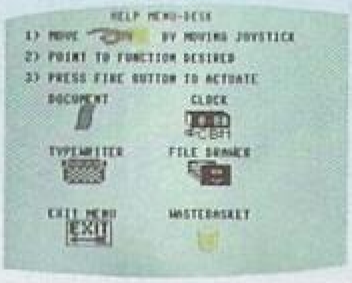

HELP MENU-DESK
1) MOVE BY MOVING JOYSTICK
2) POINT TO FUNCTION DESIRED
3) PRESS FIRE BUTTON TO ACTUATE

Special "Help" Menus

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For Even More Information Watch These Upcoming Issues!

Commodore: The Microcomputer Magazine. Issue 27: Our final issue of 1983 focuses on the microchips that have made microcomputers possible. What are these miraculous little crumbs of silicon, where did they come from and what do they do? Find out in early December.

Power/Play. Spring 1984: The newest developments on the lighter side of Commodore computing. More thrilling new games from Commodore, more programs to type and save, more on the exploits of the Commodore kids, and more on learning at home. Watch for us in early March!

Key to Entering Program Listings

```
"[F1,F2,F3,F4,F5,F6,F7,F8]":F1,F2,F3,F4,
  F5,F6, F7 AND F8
"[POUND]":ENGLISH POUND
"[PI]"PI SYMBOL
"^":UP ARROW
"[HOME]":UNSHIFTED CLR/HOME
"[CLEAR]":SHIFTED CLR/HOME
"[RVS]":REVERSE ON
"[RVOFF]":REVERSE OFF
"[BLACK,WHITE,RED,CYAN,MAGENTA,GREEN,BLUE,
  YELLOW]" THE 8 CTRL KEY COLORS
"[ORANGE,BROWN,L. RED,GRAY 1,GRAY 2,L.
  GREEN,L. BLUE, GRAY 3]":THE 8
  COMMODORE KEY COLORS (ONLY ON THE 64)
GRAPHIC SYMBOLS WILL BE REPRESENTED AS
  EITHER THE LETTERS SHFT (SHIFT KEY) AND
  A KEY:"[SHFT Q,SHFT K,SHFT V,SHFT T,
  SHFT L]"
  OR THE LETTERS CMDR (COMMODORE KEY) AND
  A KEY:"[CMDR Q,CMDR H,CMDR S,CMDR N,
  CMDR O]"
IF A SYMBOL IS REPEATED, THE NUMBER OF
  REPITITIONS WILL BE DIRECTLY AFTER THE
  KEY AND BEFORE THE COMMA:"[SPACE3,
  SHFT S4,CMDR M2]"
```

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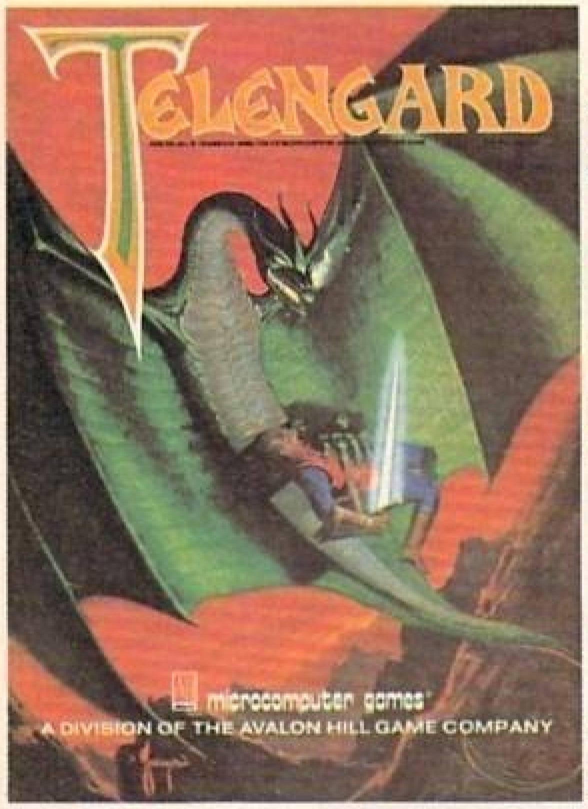
TELENGARD
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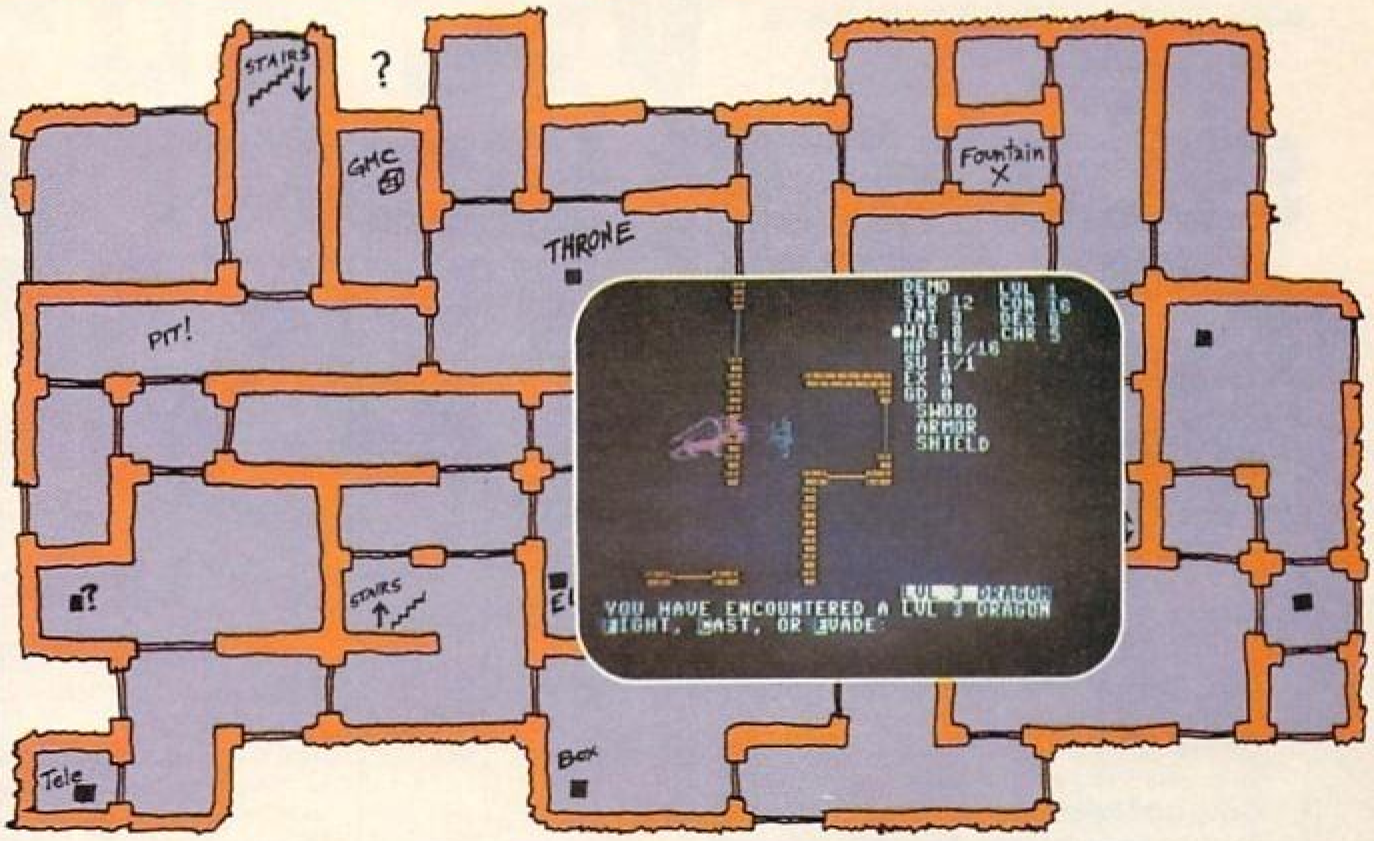
STAIRS
?
GMC
Fountain
X
THRONE
PIT!
?
STAIRS
El
Tele
Box

```
DEMO      LVL  1
STR  12   CON 16
INT  9    DEX  8
WIS  8    CHR  5
HP  16/16
SU  1/1
EX  0
GD  0
  SWORD
  ARMOR
  SHIELD
                          LVL 3 DRAGON
YOU HAVE ENCOUNTERED A LVL 3 DRAGON
FIGHT, CAST, OR EVADE
```

Telengard: How low can you go?

We've created a subterranean monster. Fifty stories low.

That's the number of levels in the TELENGARD dungeon.

Each labyrinthine level holds hundreds of dark chambers and tomb-like corridors for the mighty adventurer to explore. It goes without saying that a shifting collection of hideous monsters with unpredictable behavior patterns can make life in the TELENGARD maze quite interesting—and frequently quite short!

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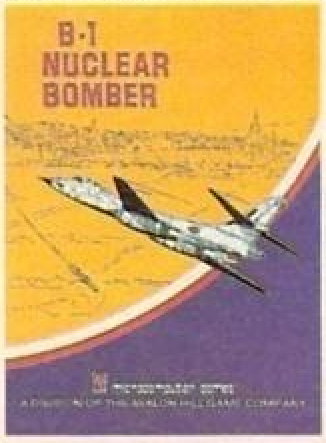
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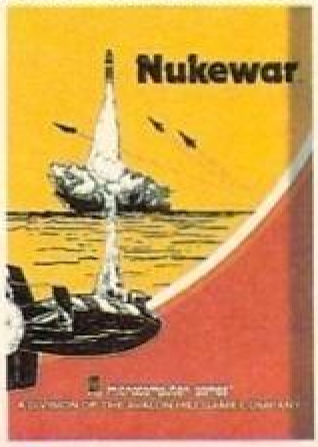
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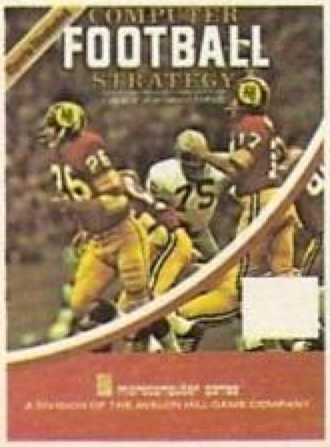
AH
QUALITY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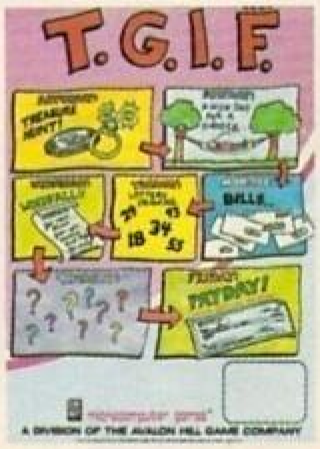
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VIC 20

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VIC 20
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CLOWNS
GORF
SEAWOLF
CARTRIDGE

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VIC 20
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KNOW YOUR CHILD'S IQ
KNOW YOUR OWN PERSONALITY
SOFTWARE

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VISIBLE SOLAR SYSTEM
MOLE ATTACK
HOME BABYSITTER
SPEED/BINGO MATH
THE SKY IS FALLING
CARTRIDGE
3+1=4
The Sky is Falling!

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VIC-20
AN INTRODUCTION TO BASIC-PART 2
WATERLOO STRUCTURED BASIC
VIC 20
commodore
ZORTEK AND THE MICROCHIPS

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VIC-20
PIRATE COVE
VOODOO CASTLE
THE COUNT
ADVENTURE LAND

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Radar Rat Race: Beat the maze. Eat all the cheese. Beware deadly cats/rats.

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VIC-20
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SUPER ALIEN
COSMIC CRUNCHER
STAR POST
SUPERSLOT
ROAD RACE
SUPERSMASH
PINBALL SPECTACULAR
SARGON II CHESS
TOOTH INVADERS
JUPITER LANDER
MONEY WARS
VIC AVENGER
RAID ON FORT KNOX
CARTRIDGE

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COMPUTERS

First In Quality Software

’Tis the Season

I’ll tell you what I want for Christmas—the *Micro Cookbook* for the Commodore 64. If you only knew what a shambles my so-called meal planning is in, you’d understand why. (Oh no, it’s five o’clock and I didn’t defrost anything for dinner… looks like it’s tuna sandwiches again.) The cookbook, which is basically a good data base manager that lets you access recipes by things like main ingredients or type of dish (dessert, main dish or whatever), would come to my rescue on those mornings I find myself staring blankly into the cupboard, unable to make any sense out of what’s there. Anybody who works and cooks would, I think, feel pretty much the same way. See April Koppenhaver’s review in this issue for more details.

However, if I were a kid what I’d want for Christmas would be one—actually several—of the new games for the VIC or 64. Especially the talking *GORF* and *Wizard of Wor,* although I have to say that *International Soccer* is one of the best action games I’ve ever seen, so maybe I’d want that one, too. Then again, *Dragonsden* has such classy graphics… and the INFOCOM adventures are so totally absorbing… whew, I’m glad I don’t have to make that decision. It’s rough being a kid, isn’t it?

Don’t forget, by the way, that even though we’ve done in-depth reviews of only our newest products in this issue, there are many, many more Commodore products that would be equally great as gifts. The teach-yourself-programming series for the VIC and 64, for instance. Or any of our line of exciting action and adventure games. Or, to be more mundane, how about the *Easy* business series for the 64? Someone on your list would probably love to have a super word processor like *EasyScript,* wouldn’t they? And a Commodore printer to use it with? If any of this appeals to you, you’ll find a complete list of Commodore products in this issue where you can browse for even more ideas.

The next time you get *Power/ Play* it will be 1984 (March, to be exact). It’s very tempting, especially since I work for a computer company, to get philosophical about the year George Orwell made famous. (For those of you who are too young to know what I’m talking about, there’s a famous book titled *1984,* written in the 1940’s by a man named George Orwell. In the book, everything people do is watched by computers and reported to “Big Brother” (a computer), who then punishes people who say or even think anything against the government. It’s a pretty scarey book.)

However, I’m going to resist temptation—except to say one thing. (You knew I couldn’t *really* resist, didn’t you?) When Orwell wrote that book he was assuming that computers—which were humongous and incredibly expensive at that time—could be owned only by huge entities like governments and big corporations and understood only by a handful of engineering-type brains. If that had remained true, chances are that our society could have eventually deteriorated into the state of blank-minded paranoia Orwell imagined.

But Orwell misjudged a couple of things—first, he couldn’t have anticipated the technological breakthroughs in scaling down circuits to the size of a potato chip crumb. And second he forgot that not even governments and huge corporations can stand in the way of a determined entrepreneur. (Kids, you can look that one up.) In other words, Orwell did not see that eventually computers would become affordable to most people, that most people would understand how they work and that companies would start selling them in the mass market. And the one thing I want to say about that is this: if anything will keep us OUT of Orwell’s version of 1984 it will be this democratization of computers (for you young guys, that means Computers for the People), which, I might add, Commodore has helped to foster.

Enough philosophizing. If you’ve been a follower of *Power/ Play* for a year or more, you’re probably familiar with David Berezowski’s famous “how to win at Omega Race” story (Winter, 1982) and the responses we got to it. Dave, who used to work in our Toronto office programming his brains down to nubs, was recently transferred to our headquarters here in West Chester (where he continues to do the same). As a result, you'll probably be hearing more from him in both our magazines—because now he's within walking distance of my office. In fact, he volunteered a slightly used but none-the-worse-for-wear story for this issue, which *The Transactor* (our cousin publication in Canada) graciously agreed to let us reprint.

You'll also notice that we're missing a few of our regular departments. That's because we were pressed for space in this issue (somehow I never thought we'd have a problem because of *too much* material, but that's what happens when you've got an enthusiastic bunch of readers who keep sending in articles). They'll all be back next issue, however, so look for them in March.

That wraps it up for 1983, but before I close I want to wish you a happy holiday and a peaceful and prosperous 1984 from all the gang here at Commodore. May you always have a blinking cursor when you need one. C

—Diane LeBold
Editor

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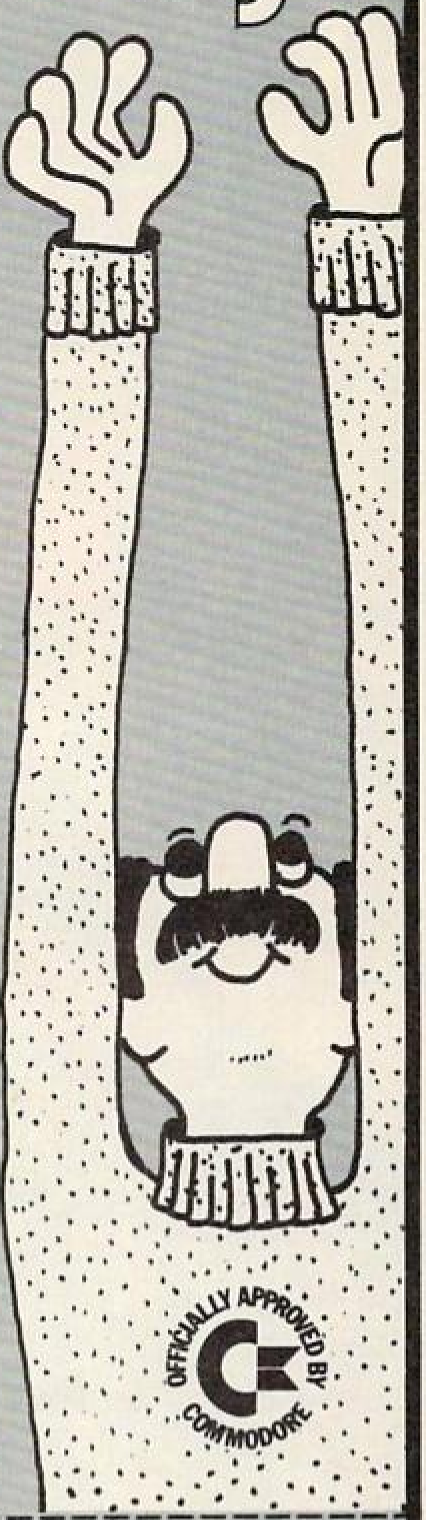

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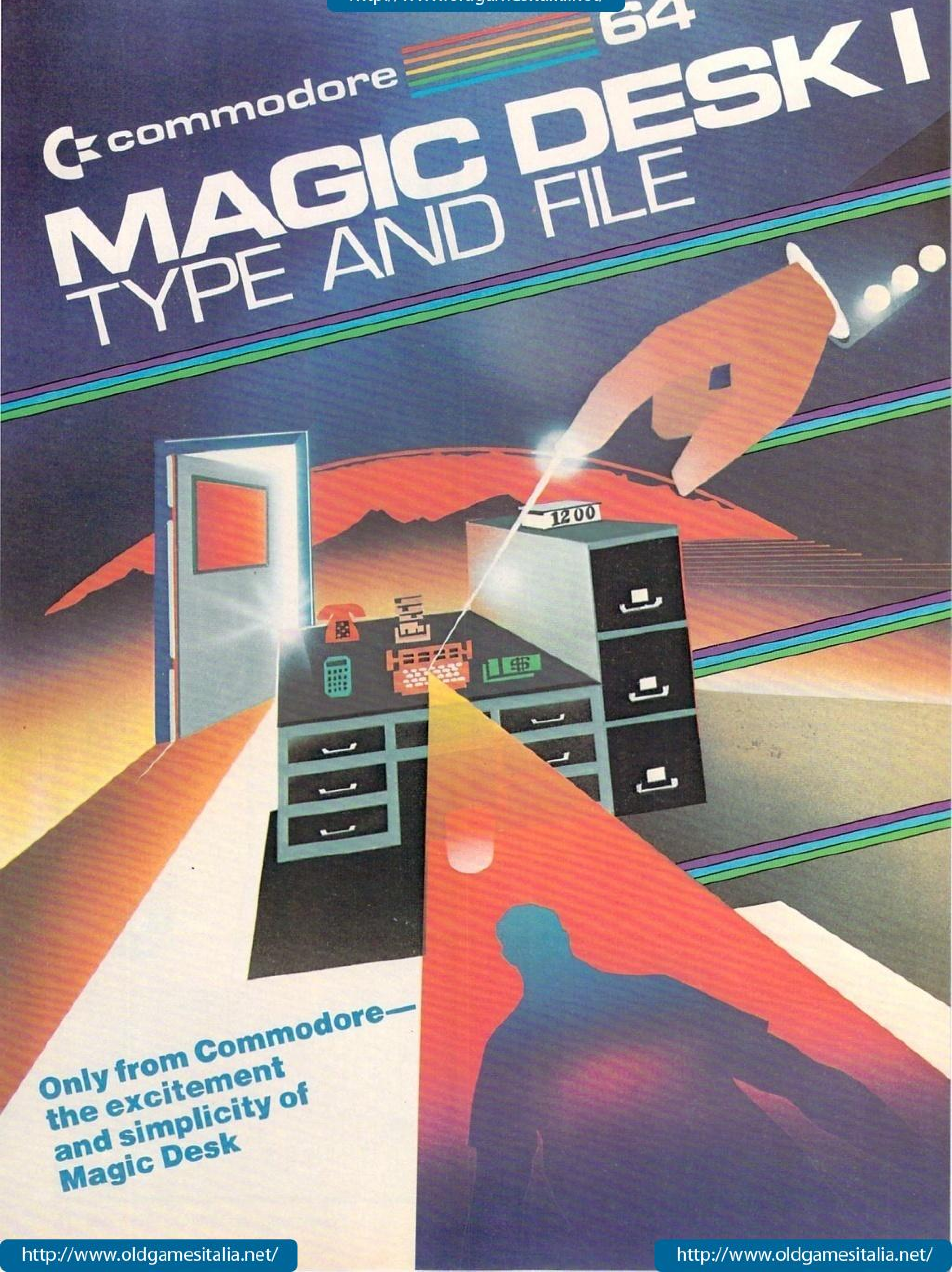
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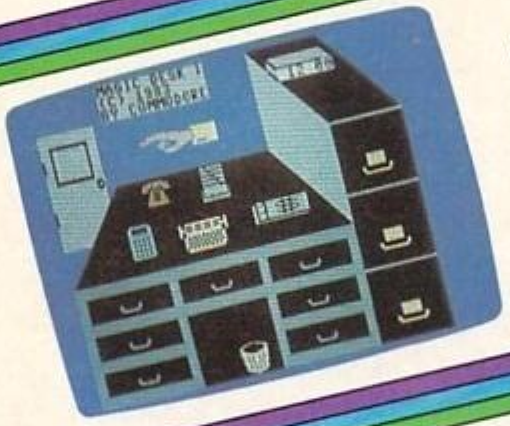
MAGIC DESK I
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BY COMMODORE

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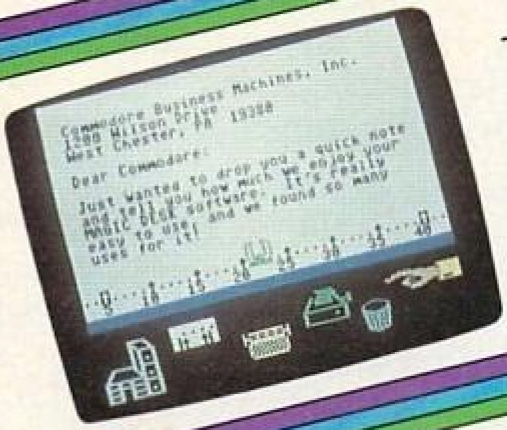
Commodore Business Machines, Inc.
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West Chester, PA 19380

Dear Commodore:

Just wanted to drop you a quick note
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MAGIC DESK software. It's really
easy to use, and we found so many
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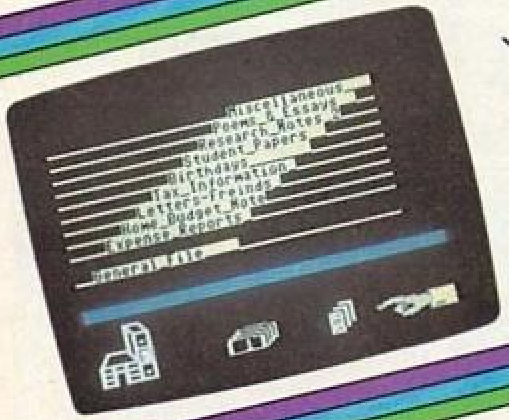
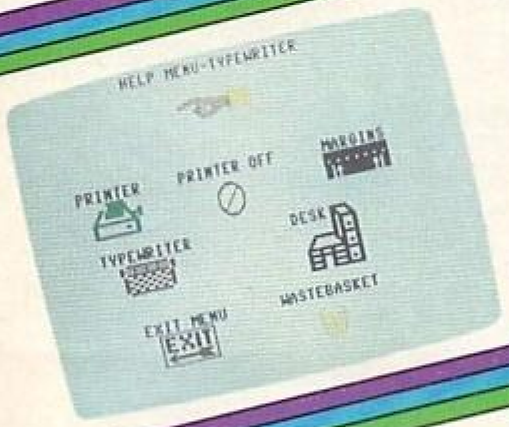
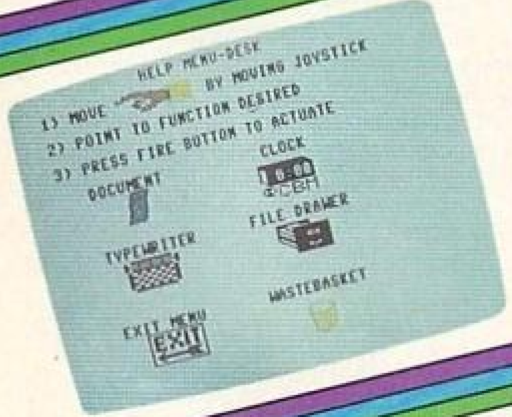

Miscellaneous
Poems & Essays
Research Notes
Student Papers
Birthdays
Tax Information
Letters-Freinds
Home Budget Note
Expense Reports
General File

Your COMMODORE 64, COMMODORE DISK DRIVE and MAGIC DESK are an unbeatable combination. Filing operations are automatically linked to your Commodore disk drive—but you don't have to know any commands—just "file" the pages you type in the file cabinet and your text is automatically saved on diskette. There are 3 file drawers with 10 file folders in each drawer and 10 pages in each folder.


HELP MENU-TYPEWRITER
PRINTER OFF
MARGINS
PRINTER
DESK
TYPEWRITER
WASTEBASKET
EXIT MENU
EXIT

To PRINT a page you've typed, just "point" at the picture of the printer and your pages are automatically printed on your COMMODORE PRINTER or PRINTER/PLOTTER. If you want to erase what you've typed, the WASTEBASKET under the desk lets you "throw away" pages. There's even a DIGITAL CLOCK which helps you keep track of time while you're typing.


HELP MENU-DESK
1) MOVE BY MOVING JOYSTICK
2) POINT TO FUNCTION DESIRED
3) PRESS FIRE BUTTON TO ACTUATE

CLOCK
CBM
DOCUMENT
FILE DRAWER
TYPEWRITER
WASTEBASKET
EXIT MENU
EXIT

Not only is MAGIC DESK easy to use . . . it's hard to make a mistake! Just press the COMMODORE key and one of several "help" menus" appears to tell you exactly what to do next. Special messages show you how the various picture commands work and help you when you make a mistake. Help messages also show you how to use the printer, filing cabinet, digital clock and wastebasket.

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First In Quality Software

we're glad you asked

Our technical editor answers readers' questions.

Q I know how to round off a number using the INT function; however, is there a way to get the VIC 20 to leave a specific number of decimal places (i.e., 13.4 or 2.45)?

A There is a simple formula to use when you want a number rounded off to a given number of decimal places. If X is the number that is to be rounded and Y is the number of decimal places, then this is the formula:

R = INT (X * 10 ↑ Y) / 10 ↑ Y

The only problem with this routine is that it will not add zeros to the rounded number. If you want to round 3.204 to two decimal places you will get 3.2 and not 3.20.

Q I am having a problem with the CMD command. When I want to list a program to the printer I type OPEN 4,4 : CMD 4 : LIST. The program is then printed and the cursor returns to the screen. I type CLOSE 4 to close the channel but then if I type LIST, the program is listed to the printer again! After that everything is okay. Is there something wrong with my computer or am I doing something wrong?

A A lot of people have this problem and many of them think that this is how the VIC (or 64) operates. The procedure that you used to close the printer channel is only half correct. Whenever the CMD command is used the opened device must be printed to before closing. So after listing your program the first time type PRINT#4 : CLOSE 4. The PRINT#4 will turn off the CMD statement and allow the channel to be closed.

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Q I want to use a small BASIC program to load and run a larger BASIC program but it doesn't seem to work correctly. The *VIC 20 Programmer's Reference Guide* suggests that it should work. Can this be done?

A Yes, a large program can usually be loaded from a small program with a little work. First you have to visualize the way that the VIC (or 64) keeps track of a program. The program text begins at 4096 (or 2048 on the 64) and uses up any number of bytes of RAM. Directly after the program text is the place where all of the variables are stored. After the variables come the arrays and following the arrays is the leftover RAM. String variable pointers are stored with the variables but the strings themselves are stored from the TOP of memory down.

Once you understand all of that, you can move on to the next step; that is, the zero-page (memory locations from 0 to 255) pointers for BASIC. There are six useful pointers when fiddling around with BASIC. Each pointer is a pair of bytes which "points" to an address in memory. The second (or high) byte is the number of times that 256 can be divided into the address. The first (or low) byte is the remainder. The beginning of BASIC on the VIC is at 4096. Divide this by 256 and you get 8, with a remainder of 0. The first byte of the pointer would be 0 and the second byte 8. To go in the other direction multiply the second byte by 256 and add the first byte (8*256 = 4096 + 0 = 4096).
The six pointers are as follows:

Memory Locations

42-44: Start of BASIC text (start of BASIC +1). This pointer holds a value of 4097 for the VIC and 2049 for the 64.

45-46: End of BASIC text, beginning of variables. This pointer holds the address of the end of your program text.

47-48: End of variables, beginning of arrays.

49-50: End of arrays (+1), beginning of leftover RAM.

51-52: End of leftover RAM, beginning of strings.

55-56: Top of BASIC. This pointer holds a value of 7680 for the VIC and 40960 for the 64.

Now with that all clear I can finish answering this question. When a program is in memory all of these pointers are set for that program. When you load one program from within another these pointers are NOT reset. If the program in memory uses 120 bytes then the BASIC text pointers, 43-44 (begining) and 45-46 (end), are set for 120 bytes. If you load in a new program from within that program it only has 120 bytes available for BASIC text. If the program is bigger than 120 bytes it will still load correctly but it will fill up the area of RAM for variable storage and array storage and maybe even some of the leftover RAM. When you try to list the program you will see only the first 120 bytes. This is why many people think that you can't load a large program from a smaller program.

Now that I've told you that I'll tell you how to get around all of that. There is another pointer in zero-page RAM that many people don't know about. Locations 174 and 175 hold the pointer to the last address of any program that is loaded into the computer (BASIC or machine language). This pointer is basically the same as the pointer at 45-46. If we can put the values at 174-175 into 45-46 after the large program is loaded but before it is run, we will have manually reset the BASIC text pointers. Since the large program will automatically run, we can have the first line of the large program do this. Use this line as the first in the large program:

```
0 POKE 45,PEEK (174) :
POKE 46,PEEK (175) : CLR
```

This little trick will allow you to load most large programs from small. However, there are some exceptions. If you can't add a line to the beginning of the large program then this obviously won't work. The other exception is when you want to keep the variables or arrays that were set up in the smaller program. Remember that only the end of BASIC text pointer is reset. When you change the pointer in 45-46, it allows the large program to write over and destroy all of the variables and arrays of the smaller program. **C**

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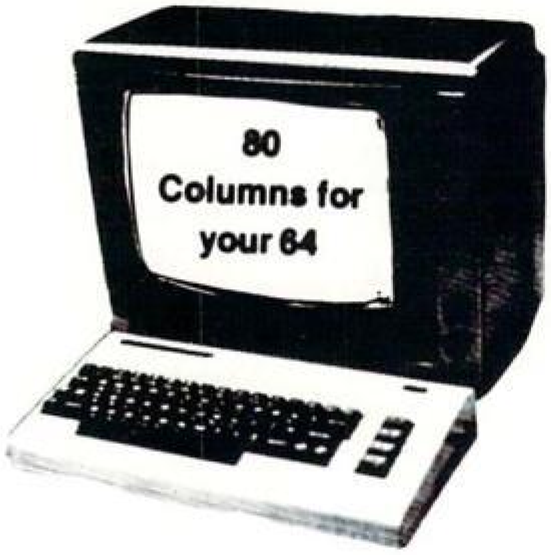

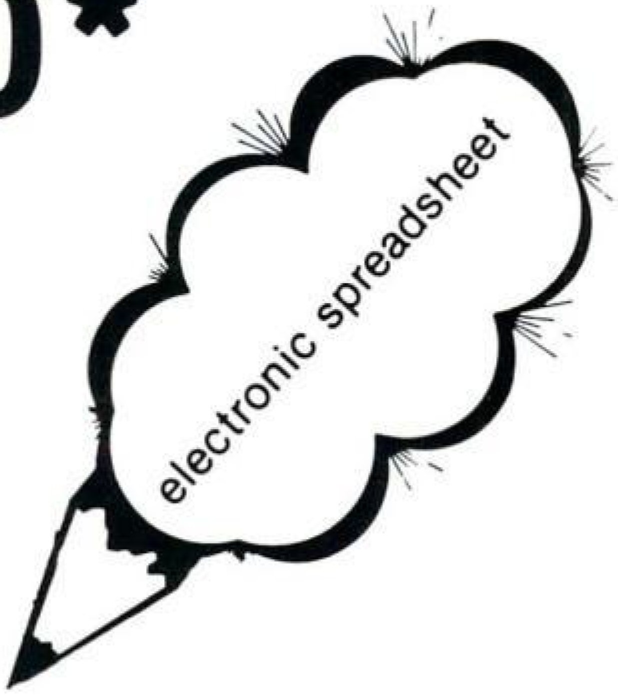

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VIC 20 Games

BLUE MEANIES	1,260 Alan S. Newman, Fairfield, CT
CAR CHASE	90,440 Alan Howard, Silver Lake, KS
CLOWNS	97,780 Jon Kirkbride, Cedars, PA
COSMIC CRUNCHER	661,320 Ralph E. Malerich, Boise, ID
DRAW POKER	17,410 R. Callia, Torrance, CA
GORF	301,470 Tricia Muller, Lafayette, IN
JUPITER LANDER	207,400 Christopher Champlain, St. Petersburg, FL
MIDNIGHT DRIVE	14.45 km Nathan Mehl, Newark, DE
MOLE ATTACK	427 Ryan Phillips, Montpelier, VT
MONEY WARS	65,110 John B. Crockford, Jr., Spencerville, OH
OMEGA RACE	476,500 (5 ships) Gary Kemper *(photos in hand, address unknown)*
PINBALL	1,500,000 Joe Ferrari, Commodore, Toronto
RADAR RAT RACE	147,240 Jennifer Zaruk, San Diego, CA
RAID ON FORT KNOX	4,454 Greg Ostrom, Saginaw, MI
SEA WOLF	29,500 Alieia Kondalski, Toledo, OH
SKY IS FALLING	22,080 Christina Zip, Perry, FL
SLITHER	261 Amy Miles, Mt. Pleasant, MI
SUPER ALIEN	45,700 Robert Schaeffer, Brookline, MA
SUPER SLITHER	167 David Goldberg, Richardson, TX
SUPER SLOT	9,675 coins Richard Woods, Woodbridge, NJ
SUPER SMASH	
VIC AVENGER	23,120 Nathan Brown, Newark, DE

Commodore 64 Games

CLOWNS	32,530 Duane Badman, Eleva, WI
KICKMAN	283,600 Stuart Pinho, Honolulu, HI

If your score didn't set a record this time, keep playing! Maybe you'll topple these champion gamesters next time!

Announcement: We'd like to start running more high scores for Commodore 64 games, so if you think you have one send in a photo of the screen with your name and address on the back. Good luck, gamesters! **C**

Venturing into PILOT

by David Malmberg

Use your Commodore 64 and PILOT to create your own adventure game.

PILOT is a great language for introducing programming and other computer concepts to children and other computer novices. The fundamentals of the language can be learned in an hour and the beginner can be writing programs by the end of the first day. Yet PILOT is by no means a "toy" language. It has all the standard capabilities found in more complex languages including input and output, calculations, looping, subroutines and branching. What distinguishes PILOT is its emphasis on *verbal* interaction. If you can read and write simple responses you can quickly master PILOT. The language does *not* require any mathematical sophistication like that needed to become proficient in BASIC, FORTRAN or PASCAL. Because of its verbal orientation PILOT is an ideal computer language for younger children or other students whose verbal skills exceed their numerical skills.

PILOT is an acronym for *P*rogrammed *I*nstruction, *L*earning *O*r *T*eaching. It was developed by Dr. John Starkweather at the University of California Medical School in 1969. PILOT was originally conceived as an authoring language that could be used by teachers who were unfamiliar with computer programming to develop computer-aided instruction (CAI) material for use in their classrooms. In order to accomplish this goal, Starkweather structured the language around carrying on a dialog with the computer. The emphasis on establishing a dialog was similar to other traditional CAI approaches. What made PILOT different was that the language was just as easy to learn and use by humanities teachers as it was by math and science teachers. Starkweather gained this broad appeal by keeping the syntax of PILOT very simple and very forgiving. He designed PILOT to have a bare minimum of instruction types and made each type so simple that it was extremely difficult to write programs that would not work.

The PILOT Language

There are only eight core instruction types in Starkweather's standard PILOT. Each begins with a single letter signifying what the instruction does:

T: Types a message on the screen
A: Accepts a response from the keyboard
M: Matches keywords in the response
C: Computes a result
R: Remarks to document the program
J: Jumps to a labeled line
U: Uses a subroutine
E: Ends a subroutine or the entire program

Labels are used to mark places in the program such as the beginning of a subroutine or a location that is jumped to by a "J" or jump instruction. Labels are normally contained on a separate program line and shown as a string of characters (up to six in Commodore 64 PILOT) preceded by an asterisk. The asterisk is not part of the label itself and is used only to signify that what follows is a label.

Consider the following short example:

```
T:Would you like to play a game ?
A:
M:yes!ok!o.k.!fer sure!all right
TY:Let's start now
TN:Maybe some other time
JN:end
        .
        .
        .
        .
*end
T:BYE
E:
```

The first statement prints a message on the screen. The second accepts a response from the keyboard. The third statement tries to match the response against the keywords: yes, ok, o.k., fer sure, and all right. (The exclamation points separating the keywords mean the same as "or.") If there is a match anywhere within the response, the computer sets a "yes" flag. For example, each of the following responses cause the "yes" flag to be set:

```
I think it will be ok to play
Yes let's play
Fer sure
```

Conversely, because they do not contain any of the keywords, the following responses set a "no" flag:

```
No way, Jose!
Not right now
Forget it!
Nope!
```

The fourth instruction types "Let's start now" if the "yes" flag has been set by having a match with one of the keywords. If no match has occurred, the "no" flag is set, the fifth instruction types "Maybe some other time" and the sixth instruction causes a jump to the label "end" later in the program.

The "N" and "Y" letters in statements four, five and six above are called conditional modifiers. These modifiers may be used with any of PILOT's core types of instructions and cause the instruction to be executed only if the "yes" or "no" flags have been set appropriately by the most recent match instruction.

PILOT has only two kinds of variables: integer (i.e., whole) numbers and strings of characters. Each type of variable is indicated by a single character A to Z. When used in "T" or "A" instructions, integer variables are preceded by a # sign. When used in a "C" or calculate instruction, the # sign is not used. For example, the following statements accept a number as input and then output that number's square:

```
T:Enter a number
A:#X
C:Y=X*X
T:#X's square is #Y
```

Variables may also be used as conditional modifiers just like "Y" and "N". For example,

```
T(X<5):#X is less than five
```

will be executed only if X is less than five.

String variables are indicated by $ sign just as they are in BASIC. In Commodore 64 PILOT, string variables must be dimensioned and must have $ signs on both sides of the variable letter when used in either "T" or "A" instructions. For example, the following lines allow the student's name (up to 15 characters) to be used within the program:

```
TH:What's your name ?
D:N$(15)
A:$N$
T:Well $N$, I'm glad to meet you!
```

The "H" modifier in the first line causes the normal carriage return to be suppressed so that the cursor is positioned just after the ? mark rather than at the beginning of the next line. The second instruction dimensions the string variable N$ to a maximum of 15 characters. The third statement accepts a response and assigns it to the variable N$. The fourth statement uses the name in typing its message.

Now let's put it all together and write a complete PILOT program. The following is a guessing game:

```
R:Guess a number from 1 to 100
TS:Hi ! My name is PILOT
TH:What's your name ?
D:N$(15)
A:$N$
T:Well $N$, would you like to play
TH:a guessing game ?
A:
M:yes!ok!o.k.!sure!all right
TN:OK, maybe some other time.
JN:end
*start
T:
T:I am thinking of a number between
T:1 and 100. Try to guess it.
C:X=1+RND(100)
C:G=0
*again
```

no more pencils, no more books

```
T:
TH:What is your guess ?
A:#B
T:
J(B=X):gotit
T(B<X):Too low!
T(B>X):Too high!
C:G=G+1
J:again
*gotit
T:$N$, you got it in only #G
T:guesses.
T:
TH:Play again ?
A:
M:yes!ok!o.k.!sure!all right
JY:start
*end
T:BYE BYE
W:50
E:
```

There are just a few points that need some further explanation. The "S" modifier in the second statement causes the screen to be cleared and the output to be printed on the top line of the screen. The RND(100) function in the first "C" or calculate instruction generates a random integer from zero to 99. When this value is added to one by the equation of variable X becomes a random number from one to 100. The W:50 in the next-to-last line causes the computer to wait for 50 tenths of a second (i.e., five seconds) before going on to the next line, which ends the program. The "S" modifier, the RND function and the "W" command are just some of the extensions in the Commodore 64 version of PILOT.

An Adventure in PILOT

Because of its ability to easily deal with text and to match for specific keywords, PILOT is the ideal language for writing adventure games. The following PILOT listing is such a game. In this adventure you are challenged to search a haunted house for treasure. During your sojourn you must exercise great care. There will be various traps, ghosts with sharp swords and other perils.

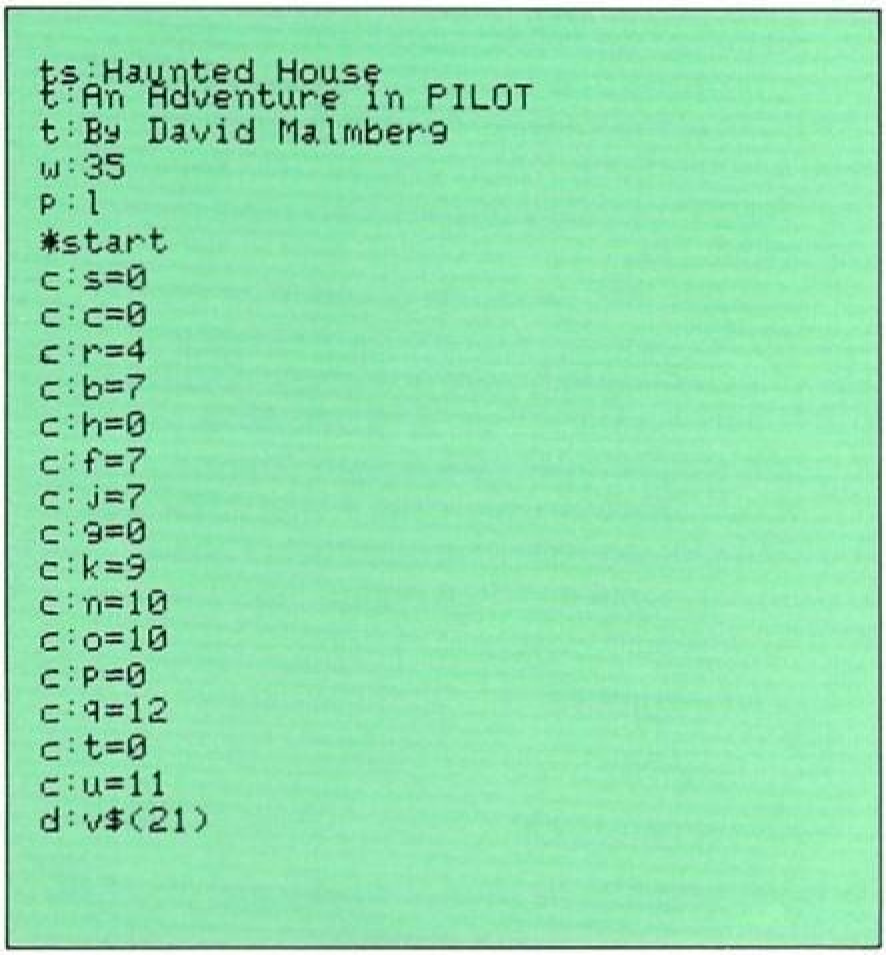
PILOT allows tremendous flexibility in handling your commands. For example, the following commands will all get you to the haunted house from the bottom of the hill:

Go up the hill
Climb the hill to the house
Go to the haunted house
Walk up the hill

Other typical commands allowed in the game are:

Get the diamonds from the desk
Examine the door
Drop the sword on the ground
Tell me the score so far
Open the east door
Read the book on the table
Tell me my inventory
Give me a hint
Drink the gin
Use the matches to light the torch
End the game

You should be able to follow the logic of the game fairly easily. Have fun!



```
ts:Haunted House
t:An Adventure in PILOT
t:By David Malmberg
w:35
p:1
*start
c:s=0
c:c=0
c:r=4
c:b=7
c:h=0
c:f=7
c:j=7
c:g=0
c:k=9
c:n=10
c:o=10
c:p=0
c:q=12
c:t=0
c:u=11
d:v$(21)
```

```
d:w$(22)
c:v$="You can't go that way"
c:w$="You can't do that here"
*loc1
c:l=1
ts:You are beside a moss covered tree at
t:the foot of a windy hill.  At the top
t:of the hill stands an old deserted
t:house that is rumored to be haunted.
t:A band of highwaymen were killed there
t:in the late 1800's.  It is said that
t:their ghosts roam the halls of the old
t:place whenever the moon is full...like
t:tonight!  Tales are told of the ghosts
t:harassing intruders who were seeking
t:the highwaymen's ill-gotten treasures.
u:items
t:OBVIOUS EXITS:North UP
*over1
c:m=0
u:stdvoc
j(m=0):over1
m:look
jy:loc1
m:go!run!move!walk!climb
jn:spec1
m:north
jy:loc2
m:up!hill!house
jy:loc3
m:tree
jy:loc4
t:$v$
j:over1
*spec1
tn:$w$
j:over1
*loc2
c:l=2
ts:You are in thick woods.  It is very
t:difficult to find your way.  The sky
t:is dark and it is misting lightly.
u:items
t:OBVIOUS EXITS:North South East West
*over2
c:m=0
u:stdvoc
j(m=0):over2
m:look
jy:loc2
m:go!run!move!walk!climb
jn:spec2
```

```
m:north!east
jy:loc5
m:west
jy:loc2
m:south
jy:loc1
m:tree
ty:The branches are too high to climb
tn:$v$
j:over2
*spec2
t:$w$
j:over2
*loc3
c:l=3
ts:You are on the front porch of the
t:old house.  The windows are all
t:boarded and nailed shut.  The door is
t:closed and has a rusted knocker.
t:You hear the distant sound of a scream
t:coming from inside the house.
u:items
t:OBVIOUS EXITS: Down
*over3
c:m=0
u:stdvoc
j(m=0):over3
m:look
jy:loc3
m:go!run!move!walk!climb
jn:spec3
m:down
jy:loc1
t:$v$
j:over3
*spec3
m:knock
jn:end3
t:You hear the sound of the door bolt
t:being unlocked.  The door creaks open.
t:There is no one there.  You boldly
t:enter.
t:
t:The door slams shut behind you.
w:75
j:loc6
*end3
t:$w$
j:over3
*loc4
c:l=4
ts:You are holding on to a branch at the
```

no more pencils, no more books

```
t:very top of the tree.  The ground is a
t:long way down and looks very hard.
u:items
t:OBVIOUS EXITS: Down
*over4
c:m=0
u:stdvoc
j(m=0):over4
m:look
jy:loc4
m:go!climb!move
jn:spec4
m:down!ground!back
jy:loc1
t:$v$
j:over4
*spec4
m:jump!fall
ty:Don't be silly.  It is too far.
tn:$w$
j:over4
*loc5
c:l=5
ts:You're deep in the woods.  There are
t:trees all around you.  You seem to be
t:lost since everywhere you turn looks
t:the same.
u:items
t:OBVIOUS EXITS:North South East West
*over5
c:m=0
u:stdvoc
j(m=0):over5
m:look
jy:loc5
m:go!run!move!walk
jn:spec5
m:north!east
jy:loc5
m:south
jy:loc2
m:west
jy:loc7
t:$v$
j:over5
*spec5
t:$w$
j:over5
*loc6
c:l=6
ts:You are in a large entry room.
t:Light filters through the windows and
t:illuminates the room.  There are two
t:open doorways and a staircase leading
t:to the second floor.  There is dust
t:and dirt on the floor.  You see foot
t:prints in the dust leading toward
t:the stairs.
u:items
t:OBVIOUS EXITS: South East Up
*over6
c:m=0
u:stdvoc
j(m=0):over6
m:look
jy:loc6
m:go!run!move!walk!climb
jn:spec6
m:up!stair
jy:loc8
m:east!door
jy:loc10
m:south
jy:loc9
t:$v$
j:over6
*spec6
t:$w$
j:over6
*loc7
c:l=7
ts:You are in the mouth of a cave.  It
t:is quite dark.  It is raining outside.
t:The cave slopes downward.
u:items
t:OBVIOUS EXITS: East Down
*over7
c:m=0
u:stdvoc
j(m=0):over7
m:look
jy:loc7
m:go!climb!move!walk
jn:spec7
m:east
jn:loc72
j(f<>100):loc73
j(h=2):loc73
t(h=1):The rain put out your torch
t(h=0):The rain has wet the torch
t:It is soaked and won't light
c:h=2
w:75
*loc73
```

```
j:loc5
*loc72
m:down
jn:sp71
t(h<>1):It is too dark to go there
j(h<>1):sp71
t(f<>100):You don't have a torch
j(f=100):loc11
*sp71
t:$v$
j:over7
*spec7
m:light!burn
jn:spa7
m:torch
jn:spb7
t(h=0):The torch is blazing
c(h=0):h=1
t(h=2):It is too wet to light
j:spc7
*spb7
m:match
ty:You burned your fingers
tn:Don't be silly!
j:spc7
*spa7
t:$w$
*spc7
j:over7
*loc8
c:l=8
ts:You are at the top of the stairs.
t:Doorways open on both sides of a hall.
u:items
t:OBVIOUS EXITS: East South Down
*over8
c:m=0
u:stdvoc
j(m=0):over8
m:look
jy:loc8
m:go!climb!run!walk!move
tn:$w$
jn:over8
m:east
jy:loc14
m:south
jy:loc15
m:down
jy:loc6
t:$v$
j:over8
```

```
*loc9
c:l=9
ts:You are in a library.  Books line the
t:walls.
u:items
t:OBVIOUS EXITS: North, East
*over9
c:m=0
u:stdvoc
j(m=0):over9
m:look
jy:loc9
m:go!run!move!walk
jn:spec9
m:north
jy:loc6
m:east
jy:loc12
t:$v$
j:over9
*spec9
t:$w$
j:over9
*loc10
c:l=10
ts:You are in the kitchen.
u:items
t:OBVIOUS EXITS: South West
*over10
c:m=0
u:stdvoc
j(m=0):over10
m:look
jy:loc10
m:go!move!walk
jn:spec10
m:south
jy:loc12
m:west
jy:loc6
t:$v$
j:over10
*spec10
t:$w$
j:over10
*loc11
c:l=11
ts:You are at the end of the cave.
u:items
t:OBVIOUS EXITS: Up
*over11
c:m=0
```

no more pencils, no more books

```
u:stdvoc
j(m=0):over11
m:look
jy:loc11
m:go!move!climb!walk!run
tn:$w$
jn:over11
m:ladder
jn:loc7
t:At the top of the ladder is a door.
t:There is a rope hanging down which
t:you pull.  The door opens and you
t:enter.
t:
t:The door slams shut behind you.
w:75
*loc12
c:l=12
ts:You are in the great hall.  There
t:are two open doorways leading west and
t:north.  There is a closed door on the
t:east wall.  A set of stairs goes up.
u:items
t:OBVIOUS EXITS: North West Up
*over12
c:m=0
u:stdvoc
j(m=0):over12
m:look
jy:loc12
m:go!run!move!walk!climb
jn:spec12
m:north
jy:loc10
m:west
jy:loc9
m:up!stair
jy:loc8
t:$v$
j:over12
*spec12
t:$w$
j:over12
*loc14
c:l=14
ts:You are in a large sleeping room.
t:There are several beds along the
t:walls.  They all look as if they
t:have been slept in quite recently.
u:items
t:OBVIOUS EXITS: West
*over14
```

```
c:m=0
u:stdvoc
j(m=0):over14
m:look
jy:loc14
m:sleep!bed!lay!lie
jn:lc141
*sleep
t:You fall into a deep, deep sleep
t:from which you will never wake.
t:
j:endend
*lc141
m:go!walk!run!move
tn:$w$
jn:over14
m:west
tn:$v$
jn:over14
jy:loc8
*loc15
ts:You are in a strange little room.
t:
t:The doors just slammed shut and you
t:hear the sound of the bolts being
t:rammed home.  You hear the sound of a
t:powerful motor starting up.
w:50
t:The walls start moving in.  You will
t:be crushed.
w:25
th:The walls move closer...
w:25
t:and closer
w:25
th:...and closer
w:25
t:...and closer
w:25
t:
j:endend
*stdvoc
c:x=rnd(100)
j(x<90):rnd1
t:
t(r=100):Quoth the raven: NEVERMORE!
t(r=1):Quoth the raven: NEVERMORE!
*rnd1
c:x=rnd(100)
j(x<90):rnd2
j(l>5):ghost
*rnd2
```

```
c:x=rnd(100)
j(x<90):rnd3
c:x=rnd(10)+2
c:g=g+x
t:
t:You find #x  gold coins.
*rnd3
t:
th:What now ?
a:
t:
c:c=c+1
m:examine!read!explore
jy:exam
m:inventory!catalog
jy:invtry
m:get!take!pick up
jy:get
m:drop!put!leave
jy:drop
m:help!hint
jy:help
m:score
jy:score
m:quit!end
my:game
jy:quit
m:light!burn!fire
jy:light
m:sit
jy:sit
m:drink
jy:drink
m:eat
jy:eat
m:open!break!enter!unlock
jy:open
c:m=1
e:
*ghost
t:
t:A ghost with a large sword suddenly
t:appears.  He looks very angry.  He
t:raises his sword above his head and
t:moves toward you.
w:30
*ghost1
t:
c:x=rnd(4)
t(x=0):The ghost swings wildly
t(x=1):He thrusts at your belly
t(x=2):The ghost swings at your head
t(x=3):He parrys your blow
c:x=rnd(6)
t(x=0):You duck and thrust
t(x=1):You check his blow and swing
t(x=2):You parry and thrust hard
t(x=3):He lands a blow. You are hurt.
t(x=4):You are hit
t(x=5):You stagger under the blow
c:x=rnd(100)
j(x<75):ghost1
j(x<82):ghost2
c:x=rnd(3)
t(x=0):You land a blow and he staggers
t(x=1):You land a lucky blow!
t(x=2):He´s down!
t:He is finished
c:s=s+100
t:
t:The ghost stands up and salutes you.
t:"We will meet again", he laughs and
t:disappears in a puff of smoke.
w:50
e:
*ghost2
t:You are dead
j:endend
*items
c:z=l
th:OTHER VISIBLE ITEMS:
c:a=0
t(l=5):leaves
c(l>4):a=1
t(l>5):Cobwebs
t(l=6):A chair
t(l=9):A large desk with a chair
t(l=10):A table and a set of chairs
t(l=12):A long table with 12 chairs
j(a=1):list1
j:list
*invtry
c:z=100
th:YOU ARE CARRYING:
t(g>0):#g  gold coins
c(g>0):a=1
j(g>0):list1
*list
c:a=0
*list1
t(r=z):A noisy raven
c(r=z):a=1
t(b=z):Jeweled sword
c(b=z):a=1
```

no more pencils, no more books

```
j(h<>0):list2
t(f=z):An unlit torch
c(f=z):a=1
*list2
j(h<>1):list3
t(f=z):Blazing torch
c(f=z):a=1
*list3
j(h<>2):list4
t(f=z):Wet torch
c(f=z):a=1
*list4
t(j=z):Matches
c(j=z):a=1
t(k=z):A book: "Adventures in PILOT"
c(k=z):a=1
t(n=z):Bottle of Gin
c(n=z):a=1
t(o=z):Food
c(o=z):a=1
t(p=z):Some gold keys
c(p=z):a=1
t(q=z):Silver Goblet
c(q=z):a=1
t(t=z):Diamonds
c(t=z):a=1
t(u=z):A long ladder
c(u=z):a=1
t(a=0):Nothing
e:
*objt
c:i=0
c:e=0
m:all!every
cy:i=-1
m:raven!bird
cy:i=1
cy:e=r
m:sword
cy:i=2
cy:e=b
m:tree
cy:i=3
cy:e=-100
m:leaves
cy:i=7
cy:e=-98
m:chair
cy:i=4
cy:e=-99
m:cob!web
cy:i=8
```

```
cy:e=-98
m:torch
cy:i=5
cy:e=f
m:match
cy:i=6
cy:e=j
m:desk
cy:i=9
cy:e=-99
m:table
cy:i=10
cy:e=-99
m:book
cy:i=11
cy:e=k
m:bottle!gin
cy:i=12
cy:e=n
m:food
cy:i=13
cy:e=o
m:key
cy:i=14
cy:e=p
m:silver!goblet
cy:i=15
cy:e=q
m:diamond
cy:i=16
cy:e=t
m:ladder
cy:i=17
cy:e=u
m:bed
cy:i=18
cy:e=-99
e:
*get
u:objt
j(i=8):cobweb
t(i=-1):You must be specific
j(i=-1):getend
t(i=0):I don't understand
j(i=0):getend
t(i=-99):It is too heavy
j(i=-99):getend
t(i=-98):There are too many
j(i=-98):getend
t(e<1):It is beyond my power
j(e<1):getend
t(e=100):You already have it
```

```
j(e=100):getend
t(e<>1):I don't see it here
j(e<>1):getend
t:OK
c(i=1):r=100
c(i=2):b=100
c(i=5):f=100
c(i=6):j=100
c(i=11):k=100
c(i=12):n=100
c(i=13):o=100
c(i=14):p=100
c(i=15):q=100
c(i=16):t=100
c(i=17):u=100
*getend
e:
*drop
u:objt
t(i=-1):You must be specific
j(i=-1):drpend
t(i=0):I don't understand
j(i=0):drpend
t(e<1):It is beyond my power
j(e<1):drpend
t(e<>100):You don't have it
j(e<>100):drpend
t:OK
c(i=1):r=1
c(i=2):b=1
c(i=5):f=1
c(i=6):j=1
c(i=11):k=1
c(i=12):n=1
c(i=13):o=1
c(i=14):p=1
c(i=15):q=1
c(i=16):t=1
c(i=17):u=1
*drpend
e:
*exam
u:objt
t(i=-1):You must be specific
j(i=-1):exend
t(i=0):You see nothing special
j(i=0):exend
j(e=100):exaok
j(e=1):exaok
j(e=-99):exaok
j(e=-98):exaok
t:It is not here
```

```
j:exend
*exaok
t(i=1):A ordinary black raven
t(i=1):Quoth the raven: NEVERMORE!
t(i=2):It has a razor sharp blade
t(i=3):It is just a tree
t(i=4):It looks comfortable
t(i=7):Lot of leaves.
j(i=8):cobweb
j(i<>5):exe1
t(h=0):It weighs about 2 pounds
t(h=1):It is very bright and hot
t(h=2):The torch is soaked
*exe1
t(i=6):Ordinary sulfur matches
t(i=9):Something fell out
c(i=9):p=1
t(i=10):There is something under it
c(i=10):t=1
t(i=11):You learn something new
t(i=13):You are hungry
t(i=18):You are very sleepy
*exend
e:
*help
t(l=1):There is a noise in the tree
t(l=7):Stay out of the rain
t(l=5):Remember Horace Greeley
t(l=14):You are very sleepy
t:Don't be afraid, it is only a game.
e:
*light
m:torch
jn:lig1
t(h=2):It is too wet to light
t(h=1):It is already lit
c(l=7):m=1
j:endlig
*lig1
m:match
ty:The match burns your finger
t:That is dangerous
*endlig
e:
*sit
t:That is comfortable
e:
*eat
t:That was delicious
e:
*drink
t:It has been drugged
```

no more pencils, no more books

```
j:sleep
*open
m:door
ty:The door is locked
tn:Sorry it is impossible
e:
*cobweb
ts:A spider bites you and you die
*endend
t:
c:h=-1000
u:score
j:quit
*score
c:s=s+h+9*c+2*9+b+r+f
c:s=s+k+o+p+q+t+u
t:
t:Your score is #s  points
t:
e:
*quit
th:Want to play again ?
a:
m:y
jy:start
t:BYE
w:75
```

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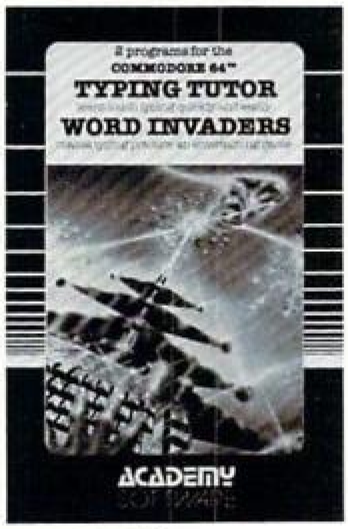

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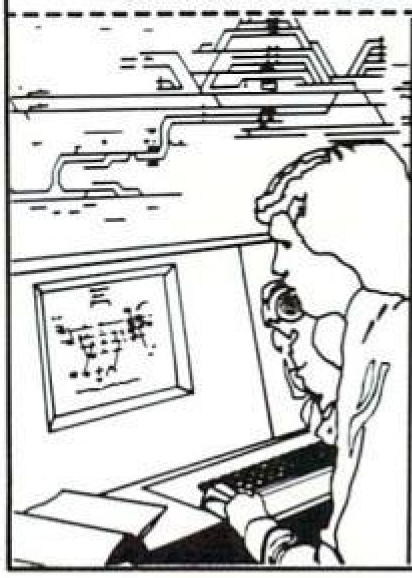

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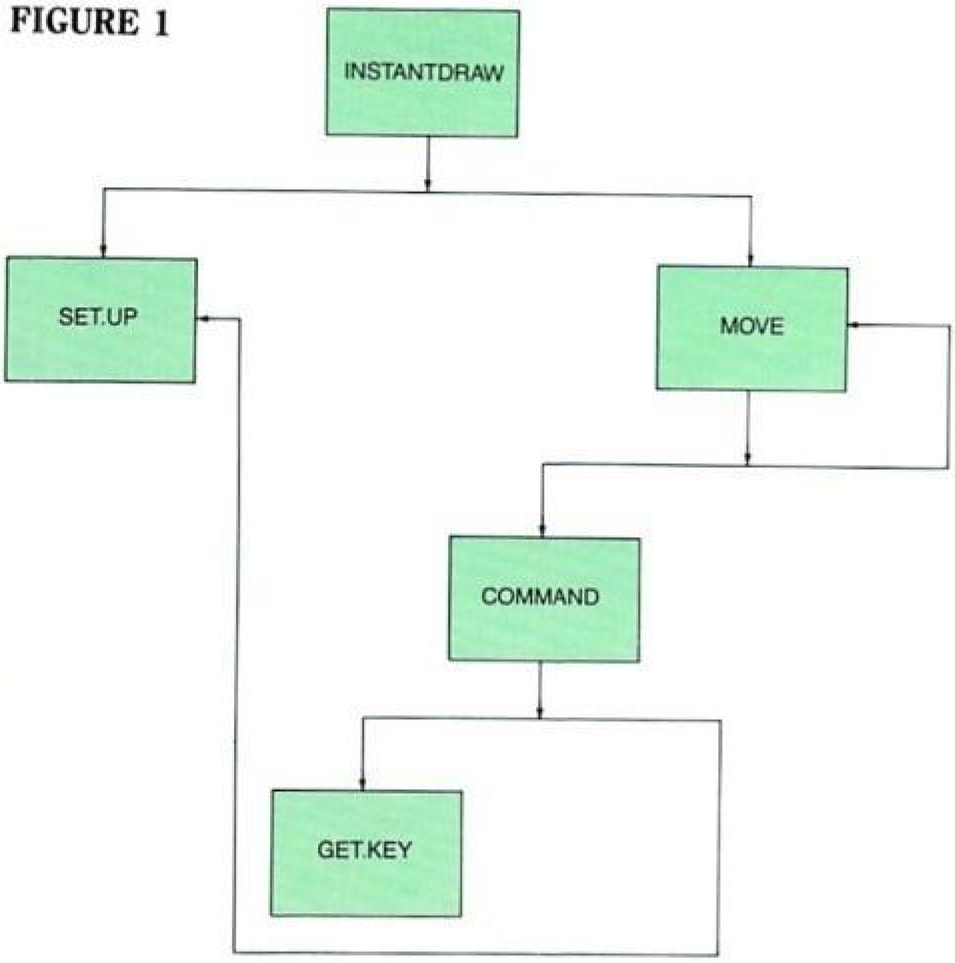
everywhere. Specifically, we have:

```
TO SET.UP
   MAKE "STEP 0
   DRAW
   FULLSCREEN
END
```

The last procedure is called INSTANTDRAW and it is the one executed to start the entire program:

```
TO INSTANTDRAW
   SET.UP
   MOVE
END
```

FIGURE 1



Notice that when INSTANTDRAW is executed it calls SET.UP and MOVE. MOVE is executed over and over again by recursive calls to itself, and SET.UP is not executed again unless a "C" is hit in the COMMAND procedure to clear the screen and begin a new drawing.

The clearest way to see how these procedures fit together and to see what procedures call or reference what other procedures is by constructing a *procedure diagram* or, as it is sometimes called, a *procedure tree*. Figure 1 is a procedure diagram for INSTANTDRAW. In the diagram, each procedure shows the procedures that it references just below it, starting with the one called first on the leftmost side. Notice the "circular" reference to MOVE to indicate recursion.

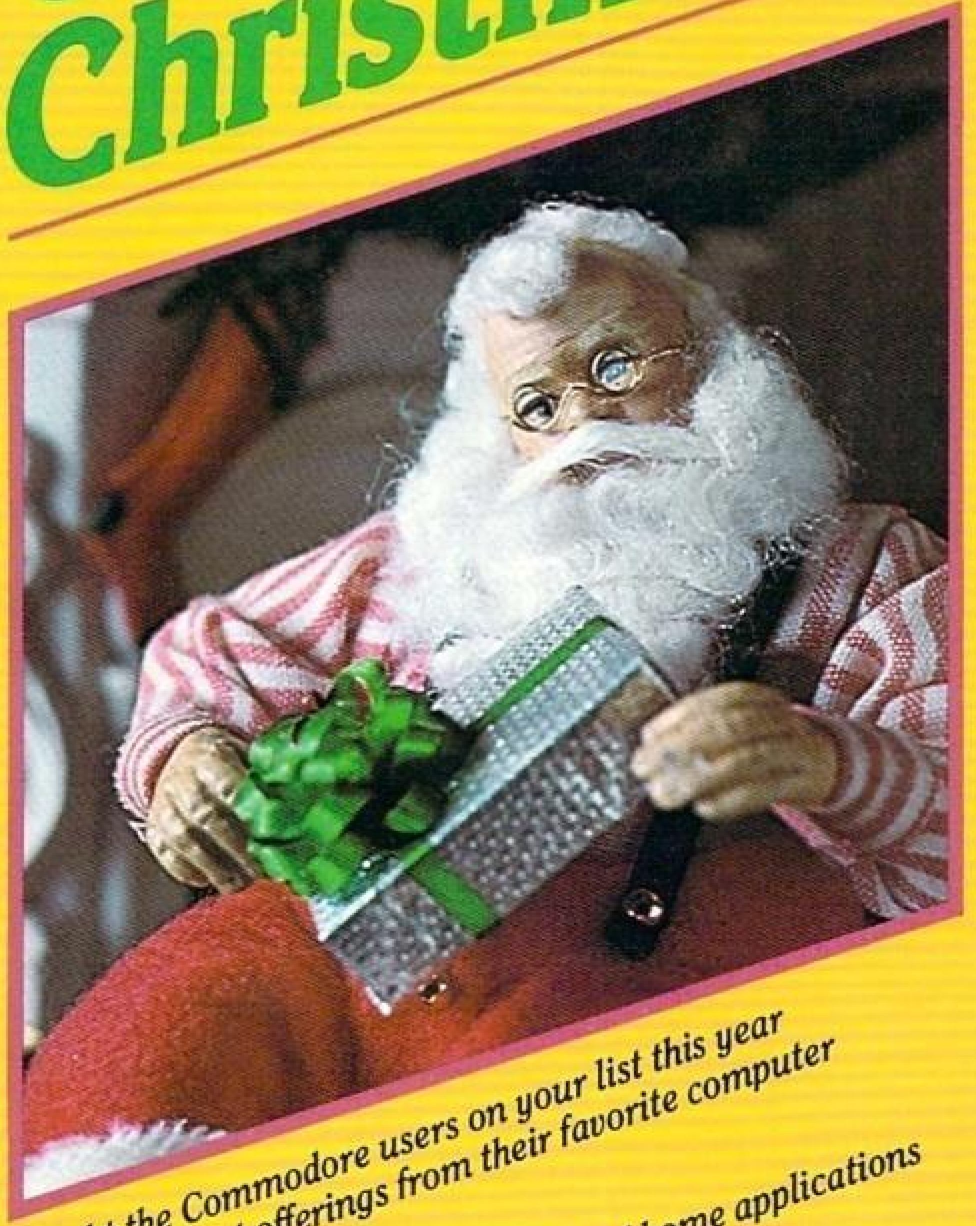
Typically, when developing a LOGO program, you will find it helpful to sketch out an overall procedure diagram to identify the specific tasks or procedures to be programmed and to clearly understand the sequence and the relationship between these individual procedures. This process is sometimes called *top-down* design. After you have produced this top-down overview you will tend to program the individual tasks from the *bottom-up*—with separate testing of each procedure as you go along to assure that each does what it is supposed to do.

LOGO Lander

The procedure diagram for LOGO Lander is given in Figure 2 and the listing is at the end of the article. The program uses a few more LOGO tricks and some new commands (see the Commodore 64 LOGO reference manual) but the overall ideas and structure for interactivity are quite similar to INSTANTDRAW and are fairly straightforward.

At first blush, LOGO Lander appears to be a straightforward game. You try to land your command module (represented by the turtle's triangle shape) on the planet LOGO without crashing. But this game is really a vehicle for teaching a great deal more than just hand-eye coordination. LOGO Lander teaches many principles of Newtonian physics in a painless and even fun manner. By playing the game, the student learns about resultant forces, the laws of motion, gravity and even about some of the perils of space travel.

Give a Commodore Christmas



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PHOTOGRAPHY BY BOB EMMOTT
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New Games For The Commodore 64

International Soccer

Gorf and Wizard of Wor

Dragonsden

Suspended

And More Favorites

Action games that really show off the high-res capabilities of your 64 and use that huge memory to the max—to put your reflexes and thinking skills to the ultimate test. Games that talk! And adventure games that take you through the fantastic realms of your own mind—seeking treasure, solving mysteries or saving the world from destruction. All new, all the best yet from Commodore.

An Instructional Guide to World-Class International Soccer on Cartridge for the Commodore 64

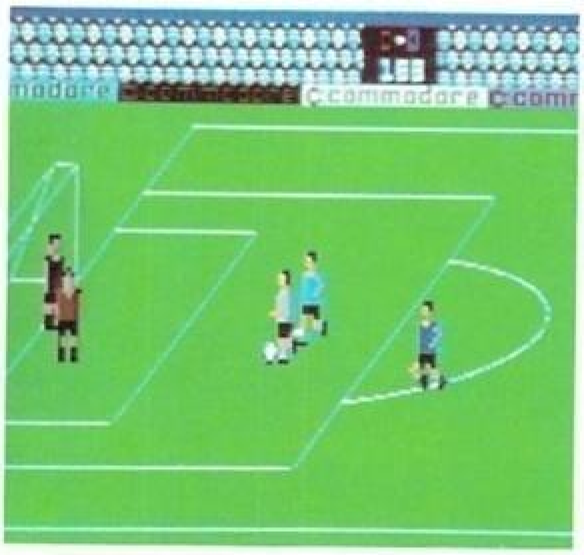
By Steve Finkel

The red-shirted fans in the crowd stand and roar their approval. The red-clad players scramble back to their defensive zone after scoring a goal while the opposing blue team waits impassively at midfield for play to start. The score reads 1-0 as the clock continues to tick. The referee's whistle sounds as the blue team resumes play with possession of the ball and penetrates into the red defensive zone. Some good passing produces several shots on the red goal, as the goalkeeper dives to deflect each shot. Finally, he is unable to prevent a header from going in and the blue team has evened the score. This brings the blue-shirted fans to their feet.

This is a scenario from Commodore's new *International Soccer* game for the Commodore 64. It is by far the most realistic sports game available for the 64, demanding strategy and real skill to master. Yet even though it will challenge the best, it will still be fun for the less skilled player.

There are countless details in the game that make this an outstanding version of soccer, with strikingly accurate and exciting play quality. For instance, if you don't like the teams' color combination—blue against red—you can change both teams to another color. Depending on your own preference you can opt for yellow, orange, white, gray or even choose non-chroma black and white players.

Soccer can be played with two players or against the computer.

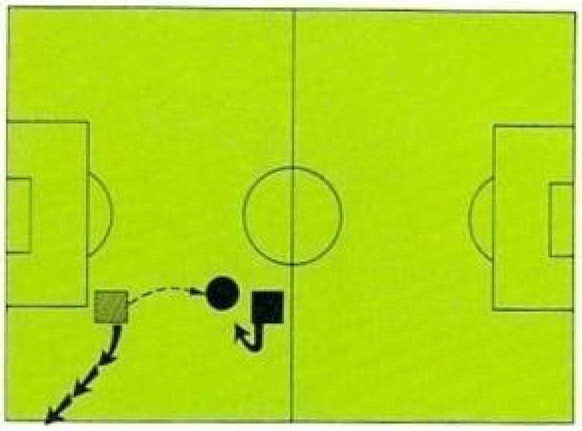


When playing the computer you can choose the skill level of your opposition from one to nine. A level nine computer team plays letter-perfect soccer, passing crisply, shooting accurately and playing tough defense. A level one opponent is eminently beatable and an adequate opponent for a young child.

After you select colors and opponent, the action starts. You directly control one player with your joystick at any given time. This player changes color from his teammates to be easily differentiated. For example a player on the blue team turns light blue, a player on the red team changes to pink, etc.

The player who is under direct control is determined by ball possession. The offensive player with the ball or nearest the ball will change color, so you know he is the one who can be directed by your joystick. Meanwhile, the other players on the team will run patterns in their appropriate zone, related to the movement of the ball. The defensive player closest to the ball also comes under joystick control if there are two players. The other defensive players then simply play their zone or pursue the ball. Only a portion of the field may be seen at one time, scrolling horizontally as the ball moves up and down the field.

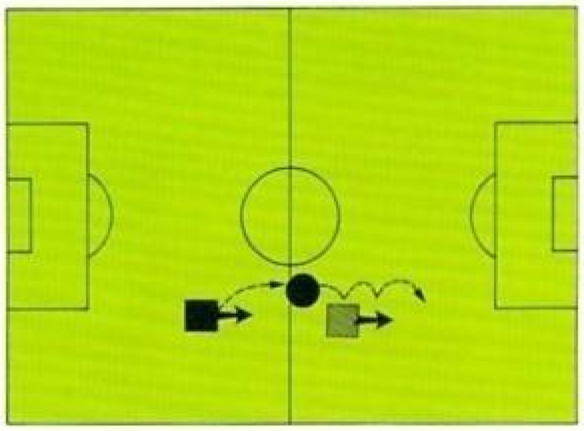
If a controlled player goes off the screen a player on screen will change color. This can be used to great advantage on both offense and defense. For example, you can use this principle on offense when passing to a man ahead of the ball carrier. After kicking the ball forward (by pressing the fire button) to make a pass you still control the player who kicked the ball and cannot control the receiver until the pass reaches its target. However, to gain an advantage, you can enable the receiver to go after the ball before the ball reaches him. Use the joystick to move the player making the pass off the screen, back toward his own goal. Once he is off the



Passing: Player making a pass downfield is under joystick control. To gain control of the receiver, run the passer off the screen immediately after making the pass.

screen, the player receiving the pass will come under joystick control and may retrieve the ball before defenders can get to him.

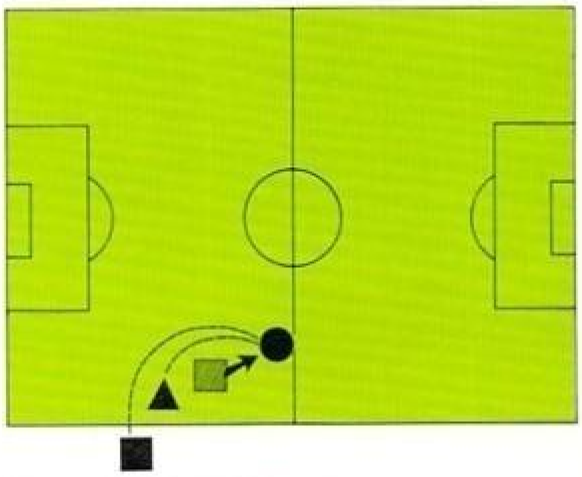
This same principle can be effectively applied to defense as well. If the man you're controlling is too far behind the player carrying the ball you can run him off the screen to gain control of a man in a better position in the defensive zone.



Heading the ball: Kicking the ball from directly behind a player may cause him to head the ball. A player can head the ball downfield if he continues in the direction he was going when he first headed the ball.

Players move at different speeds: a player dribbling the ball moves slower than a player without the ball. This makes a downfield passing attack very important. A good passing strategy is to guide the man controlling the ball downfield and have him kick the ball ahead just as a defensive man catches up to him.

Another way to move the ball downfield is by getting a player to "head" the ball. A player is able to bounce the ball on his head repeatedly, carrying it downfield. The advantage is that a player heading the ball moves at the same speed as a player running without the ball. To get a player to head a ball, you must pass directly at the player from a distance that puts the height of the ball around the receiver's head. The receiver will then bounce it in the air for a limited time as he proceeds downfield. As with passing skills, it is possible to become sophisticated in heading ability. It is also possible to pass the ball or score goals using this tactic.

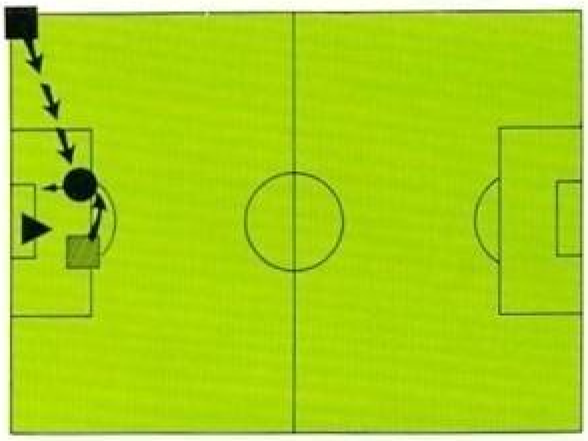


Inbounds passing: The player receiving the throw should be about three to five strides from the sideline and move away from the passer.

Another aspect of the game you need to master is positioning and moving players on throw-ins and corner kicks. If one team kicks the ball out of bounds over the sideline, the other team gets a throw-in. These overhead passes can be difficult but can also lead to goals and attacks on goal if done well. (If done poorly, they can also lead to goals and attacks on goal —for the other team!) One factor that makes this play easier is the shadow of the ball, which is visible on the field when the ball is in the air. The shadow can be a great help in judging where the ball will land.

Positioning is also a key to inbounding well. The passer will usually overthrow the ball, so the player getting the throw-in should be positioned about 3-5 strides from the sideline and move away from the passer to receive the ball. It is also a good idea to try to keep a defensive man between the passer and the receiver. If you are receiving the in-bounds pass in a crowd it is sometimes a good play to press the fire button at the instant the ball reaches your player. If the positioning is right the player will kick or head the ball forward.

When defending against an inbounds pass it is best to stay behind the player receiving the pass since you have better position to get the ball. Another factor to keep in mind is defensive position. It is a good strategy to place your defensive player nearer your goal than the receiver is. If the receiver seems to be too far away from the passer, the defensive player can gamble and cut in front of the receiver to steal the pass.

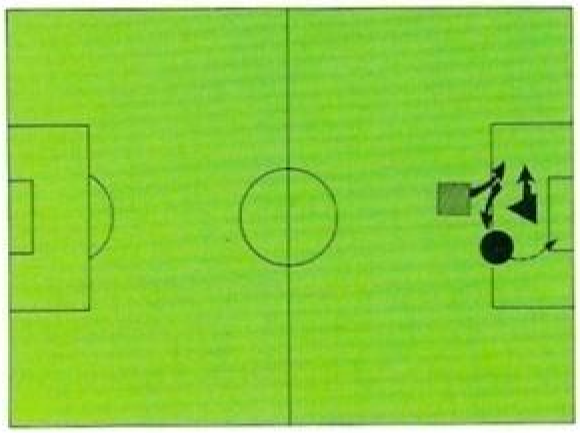


Corner kick, offensive strategy: Position your receiver about one stride in front of the goalie. Then run a loop away from the goal and back toward the corner where the ball was kicked.

A team gets a corner kick when the opposing team is responsible for kicking the ball over their own end line. Corner kicks can be very difficult to defend against if well executed. There are several good strategies for effective corner kicks. The positioning of the player in front of the net is again important, as is his movement. He must "out position" the defensive man to get the ball, as well as place himself in goal-scoring position.

If an offensive player is properly manipulated it is possible to head or kick the ball into the net before the defense or goalie has a chance to react. One strategy that is usually effective is to position your player about one stride in front of the goalie. When the ball is kicked run a loop away from the goal then back toward the corner from where the ball was kicked. When the ball reaches your player angle him toward the net and press the fire button. The defense will be hard pressed to stop this maneuver!

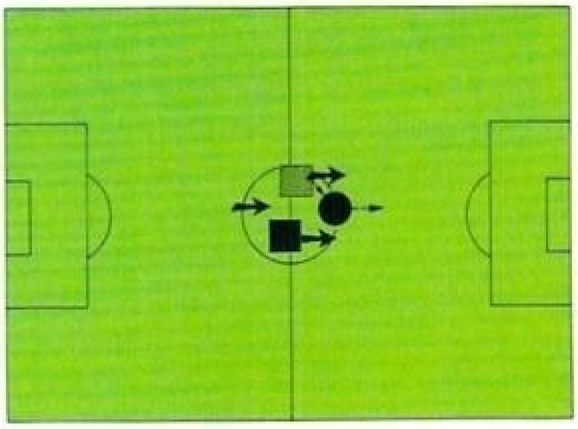
Of course they can stop it if they play it right. The best defense against a corner kick is usually to keep your defensive man just in front of the near post and move out to intercept the pass before it reaches its target. But do not press the fire button unless you are absolutely certain that this player will be able to kick the ball, because if the offensive team gets possession instead, when you press the fire button your goalie will dive after the ball. If the offense does not shoot immediately, then he'll have an open net to aim for while your goalie tries to recover.



Goal feint: Fake toward the goal so the goalie commits to making a save, then kick the ball into the open net before the goalie is able to recover.

This brings up how to use the goalie. The goalie automatically saves balls kicked right at him. On shots that he must move to save (balls kicked over his head or to his left or right) the fire button must be pressed. The goalie will then automatically go toward the location of the ball. If the ball is kicked left, he dives to the left to make the save. If it's kicked over his head, he jumps straight up. But if the ball isn't kicked he dives in futility, leaving the net undefended and looking rather silly in the process. Timing is important; a poorly timed jump can allow an easy shot to score.

Utilizing this knowledge, you can make an offensive opportunity count by faking toward the goal, getting the goalie to commit to making a save, and kicking the ball into the open net before the goalie is able to recover. Another way to score is to take a shot on goal, forcing the goalie to make a save, and putting the rebound home before the goalie can recover. Rebounds usually come out near the edge of the goal crease, so if the goalie had to dive to make the save, a quick kick will score. The only way for the defense to prevent this (if unable to capture the rebound) is to try to cut off the shot before it reaches the empty net. There are other ways to score, such as using certain angles to shoot from or attacking the net with two offensive players, that also can be effective.



Opening maneuver: Steer the man with the ball toward the other forward, so they go downfield in tandem. When they are challenged by a defensive player maneuver them so the defense is covering the player without the ball and the ball carrier is in a position to make a break downfield.

The opportunities to develop the nuances of this game are nearly unlimited. Rather than give away too much information (that you'll probably enjoy discovering and refining on your own) I'll disclose one of the better opening strategies that would be obvious with a little experimentation. As soon as the opening whistle sounds steer the man with the ball toward the other forward. When they are both in contact with the ball they will alternate turning color (light blue and blue for the blue team, pink and red, etc.) and will go down the field in tandem. When challenged by a defensive player maneuver them so the defensive player is covering the player without the ball and the ball carrier is in a position to begin a break downfield. This is easier than it sounds, and often very effective.

Many strategies can be developed for use against another player or the computer. You'll find what often works against the computer fails against the human element and vice versa. There are many intrinsic elements of the game that can be developed, formulated, and refined.

This is a game that can be played at several levels; it can be an easy, straightforward contest or a territorial struggle in which the winner is determined by superior strategy, skill and even the occasional lucky break (the pass that bounces off a player's back right to an out-of-position defender or the long-distance shot that rolls under the diving goalie). It is a challenging game that mirrors the excitement of real-life soccer. This excitement continues even after the game when the winning team is presented with a gold cup as their fans in the stands cheer wildly. In short, *International Soccer* is a game for everybody! **C**

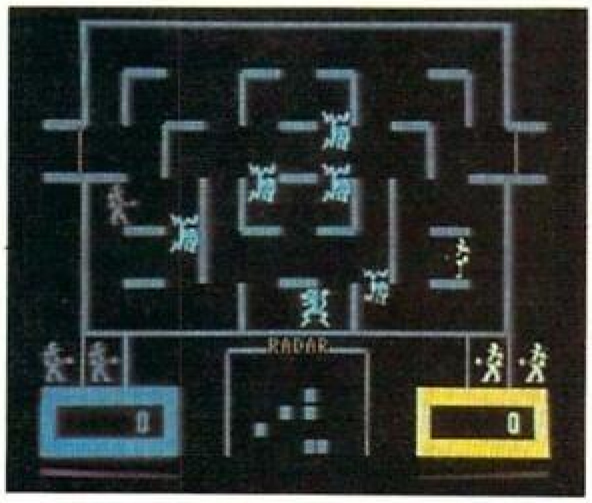
GORF and Wizard of Wor: Talking Games on Cartridge for the 64

By Neil Harris

GORF and Wizard of Wor, the two latest Bally/Midway arcade adaptations by Commodore, are the best videogames yet. I know I keep saying that, but the state-of-the-art keeps advancing and the games get better and better. Remember just a few years ago when the big craze was *Pong?* These days arcade games feature graphics and sounds so stunning that they look almost real. The newer games even talk!

Well, these new games for the 64 will also talk to you, from taunts like, "Hey—your space boot is untied," and, "Prepare yourself for annihilation," to grudging praise like, "Nice shot, you have been promoted," and, "Remember, I'm the wizard, not you". All you need to hear the games talk is Commodore's speech synthesizer (see Betsy Byrne's review last issue). The game cartridges plug right into the speech module or directly into the computer if you don't want speech.

Graphically, these games use the sprite features of the 64 to their fullest advantage. The animation of the little creatures is just superb, with true fidelity to the arcade originals. Keep in mind that arcade machines have special hardware that costs many times what your 64 did and you have to be impressed with the efforts of the programmers.

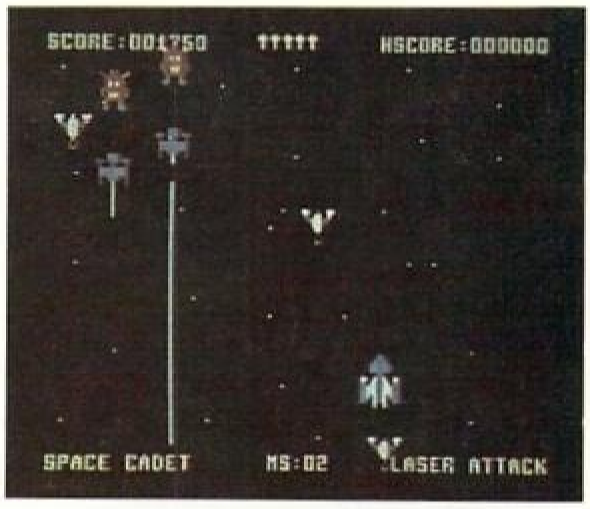


Wizard of Wor is a battle of human science versus alien magic. Your character in the game is a little human figure in a space suit with an impressive-looking ray gun. The enemies are magical monsters and the Wizard himself.

The first creatures on a level are called Burwors, monsters that look like blue squirrels. As you shoot the Burwors they are replaced by Garwors (looking like yellow hamsters), which become invisible when they're not near you. When the Garwors are shot they are replaced by Thorwors, which look like red cats and stay invisible until they're close to you. Finally, when all monsters are gone from a level, the next monster appears: the Worluck (bet you thought it'd be called a Starwor), which is kind of a blue and yellow butterfly. Shoot the Worluck and the next round will be worth double score. At this point, if you're doing too well, the Wizard himself appears, teleporting hither and yon while throwing lightning bolts.

Each level takes you deeper into the dungeon of Wor, which is populated by monsters and other unsavory characters. The dungeon looks like a maze at the easier levels, but most of the walls disappear as you get deeper, which gives the monsters a clearer shot at you. Level 4 is the Arena, where most of the middle of the screen is empty and level 13 (what else?) is the Pit, with no walls at all!

One special feature of this game is the two-player option, which lets two of you play simultaneously. You can work together by teaming up to kill the monsters or you can play cut-throat and shoot the other human in the back (you get 1000 points to tempt you).



GORF is not a translation of the VIC version, but a completely re-written game for the 64. The graphics have been jazzed up using the multi-color features of sprites. Extras like the radiating display in the Space Warp round have been added, making the action more true to the arcade original. The action is just as fast as in the arcade so you'd better be quick!

For those of you not already familiar with GORF, the game consists of four different rounds. In each round you, as Galactic Defender, must shoot all the invading Gorfian robots. The first round, Astro Battles, resembles the "invaders" games like our own Avenger, with the addition of a force shield to protect you. The second round is Laser Battles, with deadly laser beams blocking your path. The third round is Space Warp, with the enemy ships spiraling toward you and dropping fireballs in your way. The last round is Flag Ship, where you must shoot through the Gorfian's shields and hit the ship's reactor.

Once you complete the four rounds, you are promoted in rank, from Space Cadet to Space Captain to Space Colonel to Space General to Space Warrior to Space Avenger (although, regardless of how well I did, my wife still says I'm a space cadet!). Each round gets a little harder with higher ranks, especially the Space Warp round, which gets me every time.

I've played with these for several weeks now, with and without the speech module. At first I was skeptical of the "gimmicky" side of the speech, but now I'm convinced that it really enhances my enjoyment of the games. When the machine tells me that I can't escape the Gorfian robots, I usually answer that they can't escape me! These cartridges are challenging, attractive and funny—what more could you want? **C**

Table 1: Phrases from Wizard of Wor

1. Find me, the Wizard of Wor.
2. Get ready warrior.
3. My pets are getting hungry.
4. Remember, I'm the wizard, not you.
5. You'll never leave Wor alive, ha ha ha ha.
6. If you destroy my babies, I'll pop you in the oven.
7. You'll get the Arena.
8. You'll get the Pit.
9. Now you get the heavyweights, ha ha ha ha.
10. If you get too powerful, I'll take care of you myself.
11. Your bones will lie in the dungeons of Wor, ha ha ha ha.
12. Garwor and Thorwor become invisible, ha ha ha ha.
13. Worlord be forewarned, you approach the Pit.
14. Beware, you are now in the Worlord dungeons.
15. Hey, your space boot is untied.
16. Oops! I must have forgotten the walls, ha ha ha ha.
17. Come back for more with the Wizard of Wor, ha ha ha ha.
18. You can start anew but for now you're through, ha ha ha ha.
19. He he he ho ho ho ha ha ha ha, that was fun.
20. Keep going and you will find me, ha ha ha ha.
21. By Jeff Bruette.

Table 2: Phrases from GORF

1. Commodore presents Gorf, a Bally/Midway Game.
2. By Eric Cotton.
3. I am the Gorfian empire.
4. Long live Gorf.
5. Push the joystick button.
6. Gorfian robots attack, attack.
7. You will meet a Gorfian doom.
8. Survival is impossible.
9. Robot warriors seek and destroy.
10. My robot warriors are unbeatable.
11. Prepare yourself for annihilation.
12. Gorfians take no prisoners.
13. You cannot escape my Gorfian robots, ha ha ha.
14. Bad move.
15. Got you.
16. Another enemy ship destroyed, ha ha ha.
17. Your end draws near.
18. Some galactic defender you are.
19. Too bad.
20. Bite the dust.
21. Gorfians conquer another galaxy, ha ha ha.
22. All hail the supreme Gorfian empire.
23. Nice shot, you have been promoted.
24. Next time will be harder, but for now you have been promoted.
25. In the Gorfian chronicles, you have been promoted.
26. For hitting my flagship you have been promoted.

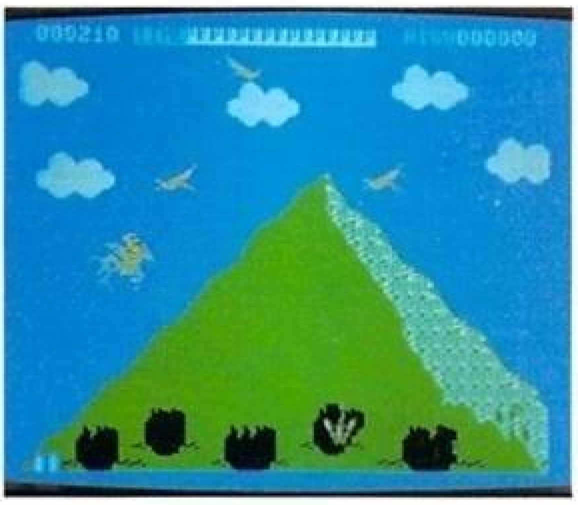
Strategy hints from Eric Cotton, programmer of GORF:

1. **Astro Battles:** Kill columns of invaders from the edge to the middle. At higher ranks you should stay at the bottom of the screen because you can crash into them.
2. **Laser Attack:** Kill the laser ship when it is high up then get the other ships as they drift down.
3. **Space Warp:** Duck and weave; don't stand still. The fireballs are smarter every second rank (Captain, General and Avenger). When there's more than one fireball on the screen pretend you're in a maze and just concentrate on survival.
4. **Flagship:** Shoot a large opening in the middle of the force screen then aim for the reactor opening. At higher ranks there can be more than one fireball but there can be only three enemy objects on the screen at a time (not counting the ship). If you don't kill the Gorfs, you'll have fewer fireballs to worry about.

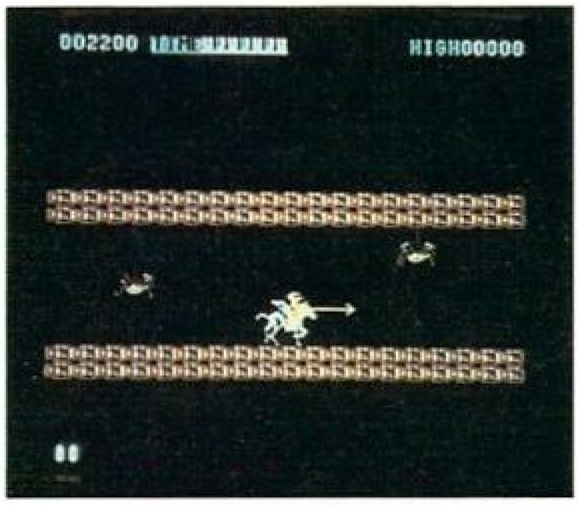
DRAGONSDEN Quest

By Steve Finkel

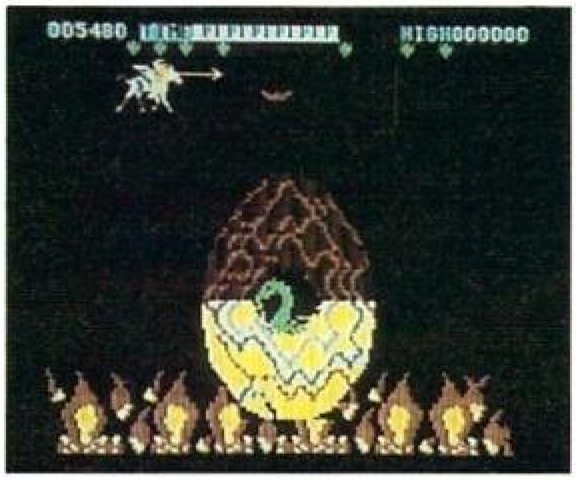
The sky gleaming blue,
the clouds floating white.
A winged horse glides by,
astride her a knight.
The horse's wings flap,
the knight raises his lance.
They fly toward the mountain,
a brazen advance.
The base of the mountain
holds five coal-colored caves
and five pterodactyl guards—
the DRAGONSDEN slaves.



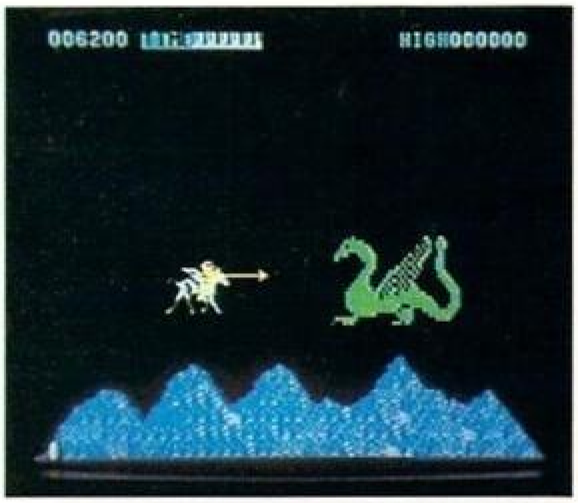
As his winged steed descends,
the knight sights his prey.
His lance at the ready,
guides his mount to the fray.
He draws the five guards
out into the sun.
His lance slashes wings;
they fall one by one.
The caves lie unguarded,
none left to defend;
the knight enters a passage,
and starts to descend.
A tunnel forgotten,
toward danger it leads;
the knight enters slowly,
his tension recedes.
Large spiders attack,
dropping down from the ceiling.
Avoiding their sting,
he continues, unfeeling.
Bats come upon him
in the narrow expanse.
He wreaks havoc upon them;
they all taste his lance.



Continuing onward,
leaving slain bats behind,
Toward the heart of the mountain,
to his mission resigned.
To face the next challenge,
a volley of spears;
his winged horse eludes them,
the knight perseveres.
The knight has survived
to face the scourge of all men,
reaches the core of the mountain,
to invade DRAGONSDEN.
In the fires of Hell
an egg waits to hatch
with deadly bat guardians
the knight must dispatch.
Throughout the knight's struggle,
the egg cracks in surges.



While the bats are defeated
the dragon emerges,
beginning the struggle
'tween dragon and knight,
a showdown gone airborn,
a duel in mid-flight.
The winged horse is swift,
the dragon immense.
The knight attacks fiercely,
no thought to defense.
The knight's will is steadfast
and sure is his aim;
absorbing two thrusts,
the dragon is game.
He turns and he charges,
bearing down on his foe;
the winged horse eludes him,
escaping the blow.



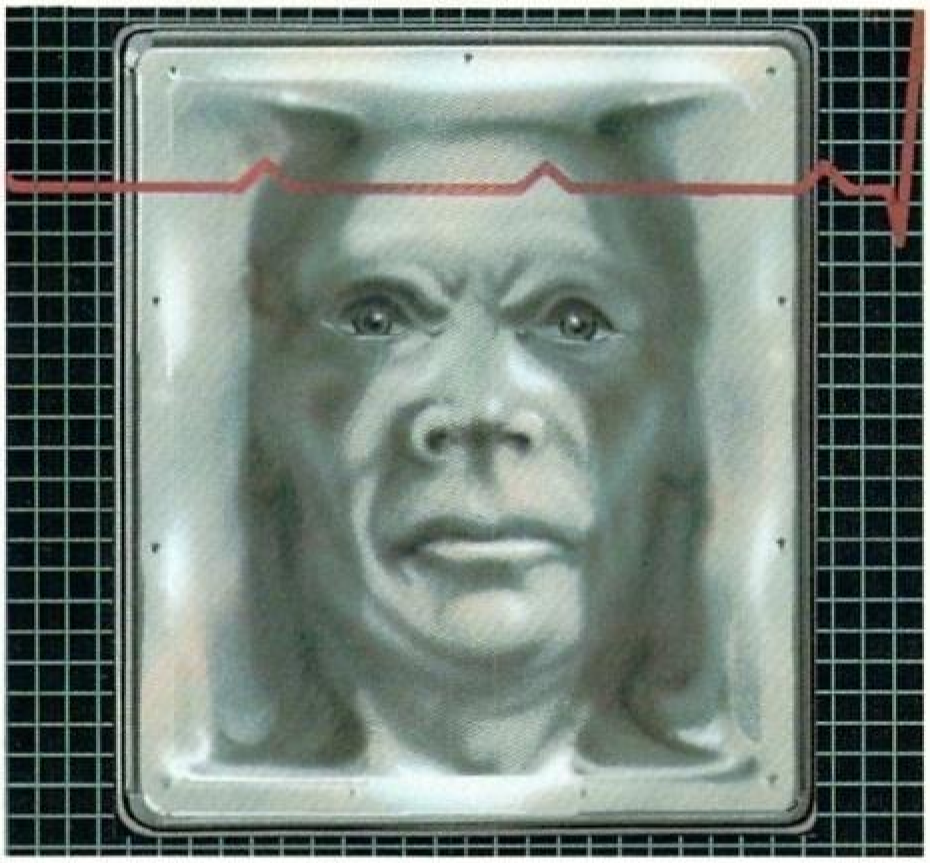
Spitting fire aloft,
the green beast enraged;
the knight feels triumphant,
his lance is engaged.
The pain and disgrace:
the dragon's retreat.
The knight follows after,
then flesh and lance meet.
A final explosion,
in colorful smoke.
The dragon is vanquished,
the knight has a Coke™.

DRAGONSDEN is an original fantasy/action game on cartridge for the Commodore 64, for one or two players. **C**

Real Men Don't Go North

An In-depth Review Of INFOCOM's *Suspended:* on disk for the Commodore 64

By Jim Gracely



Why would I want to play an adventure game? Because everybody needs a little adventure now and then. But what is this thing called adventure? To Funk & Wagnall an adventure is "a stirring or thrilling experience... risky or exciting activity". To me an adventure is a chance to pit my intellect and wits against some obstacle or challenge. An adventure is a life and death struggle to real men.

If an adventure is all of these things, then what is an adventure game? Why it must be an adventure within a game situation. Then how do you play an adventure game? Well, you imagine yourself in another land, with dragons and trolls and caves. Or you are flown through space and time to the earth in the far future or to the outer reaches of the universe.

"In closing, I tell you that these are the threads of which adventures are weaved."

> Kravis Splenter: Closing remarks of 1983 address to the National Association of Garment Gamers

The measure of an adventure's success is the degree to which you experience and live through the choices and decisions you have made.

Where do the masses of adventure games on the market fit into this definition? Well, the simplest of adventures limits your vocabulary severely. How can I experience a new world when the most exciting thing I can do is "GO NORTH"? The more advanced games allow a greater vocabulary but limit your actions. If I feel like eating a rock I should be able to. The only limiting feature of the grand adventures (*Zork I, II* and *III*, *Deadline*, *Suspended* and *Starcross*) is that you have to tell yourself (the 64) what you want to do. You have to tell yourself to "TAKE THE SWORD" to take the sword. It's like always talking to yourself (saying silently "now I'm going to...") and real men don't do that very much.

So now, what would you think of a game that doesn't have this limitation? A game which allows the reality of your actions to become as real as you want to let them. It allows you to choose your destiny. To search out new worlds and creatures. To boldly go where no man has gone before..... ta... da... da. da. da.da. dee... (Sorry. I'm just trying to keep you suspended).

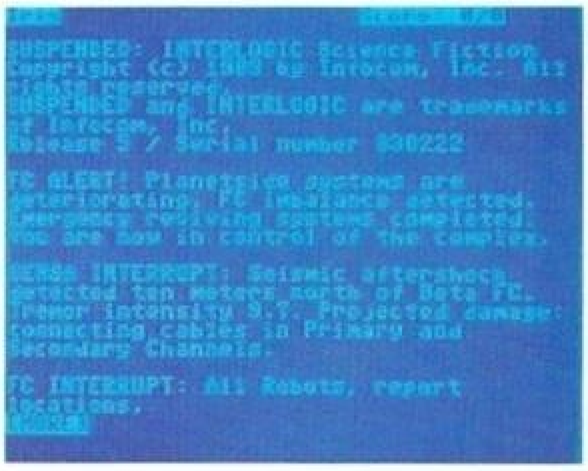
Suspended is an adventure game with some added features. Instead of telling yourself what to do, you have a robot to instruct. Now, if the robot can't do anything except "GO NORTH" it's a little easier to understand (but just wait!). In the game you are sitting at a computer keyboard with a monitor in front of you (not hard to imagine). You type in your instructions to the robot, using the computer as an interpreter, and the robot responds to you through your monitor. You are no longer talking to yourself and can resume the role of a real man. I'm not telling you the whole of it, however.

This game is much more than just telling a robot what to do. In fact you have six robots to control simultaneously! Of course you can only tell one robot at a time to do a task (except under certain circumstances) and you have to keep track of where they all are at all times. The robots exist in an underground complex. Under what ground is up to your imagination (are there tremors below your feet or is the alpha centuri solar system under your control?).

I should mention that the six robots are your basic "see no evil/hear no evil" types. That is, one is specially designed to see (that's Iris), one is designed to hear (Auda), one is designed to sense electrical currents (Sensa). Waldo is all sonar (but he's also the engineer of the bunch) and Whiz is your interface to the Central Library Core. Last, but never least, is Poet. Poet is able to examine items by their "vibes". Alas, but Poet was never taught regular speech. His words often create more confusion than they are worth:

```
It says 'While traveling
the highways and byways of
life, one doesn't always
have time to stop and look
at the roadmap' I think.
(But what do I know?
I can't read -- I learned
all my Philosophy by
reductive absurdium. Talk
to Iris and she'll read it
for you.)
```

The hardest challenge of this game is trying to figure out what the challenge of the game is. You get a nice board-map of the underground complex, complete with sticky decals of all your robots. There is a small manual describing the game setup and the personalities of each robot. The manual also includes descriptions of the Central Library Core, the Surface Systems (weather, hydroponic and transportation) and how to quit (very important). Before the game actually starts you feel prepared to do just about anything. Once it begins you're trying to find anything to do. Personally, I spent a lot of time getting to know my robots. Then I spent some time sightseeing, followed by some rest and then some more sightseeing. After the first couple of hundred moves things started to become clear to me.



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SUSPENDED: INTERLOGIC Science Fiction
Copyright (c) 1983 by Infocom, Inc. All
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of Infocom, Inc.
Release 5 / Serial number 830222

FC ALERT: Planetside systems are
deteriorating. FC imbalance detected.
Emergency revival system completed.
You are now in control of the complex.

SENSA INTERRUPT: Seismic aftershock
detected ten meters north of Beta FC.
Tremor intensity 5.7. Projected damage:
connecting cables in Primary and
Secondary Channels.

FC INTERRUPT: All Robots, report
locations.
```

Let me talk about these robots for a moment. These are definitely not tin boxes that bump into walls and reverse direction. You can really relate to these robots (sorry, real men can't). Each robot has a personality, which is displayed in the responses it gives you. I'm sure that different people will find different robots as their own "pets". Switching to a technological viewpoint for a moment—it's amazing to think of the amount of data required to allow six robots to respond entirely differently to each room, object and situation.

Back to the game. Your overall purpose in this game is to restore the entire complex to a normal balance. This will in turn allow you to restore the entire surface world to a normal balance. This is no easy task. I've been playing this game for hours (with a capital O) and each time I think that I've solved everything some unexpected twist surfaces.

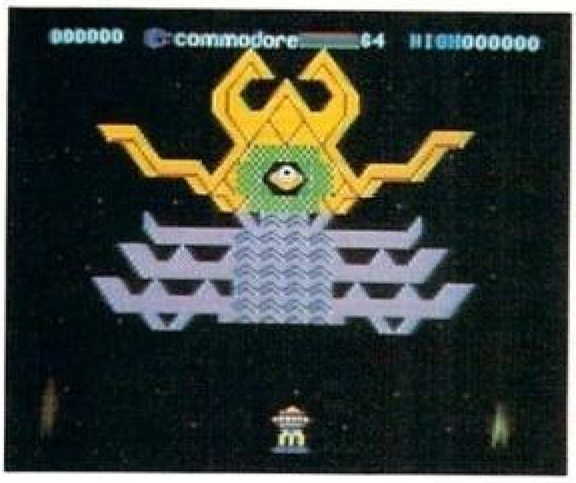
There are two special features of this game that I must mention. The first is available in all of INFOCOM's adventure games, and that is the ability to SAVE a game. In fact the ability is there to save many games at different stages on the same disk. I always save the game right before I try some doubtful or hazardous move. If I wind up dead, I can go back to where I was and not do what killed me.

The second special feature restores the challenge of the game once you have successfully brought peace to the world. When the game is first started you can use a command called CONFIG (for configure) to change some of the beginning parameters of the game. In this way you can increase the difficulty of the game for yourself. After the game is completed once, there is always room for improving your score (number of people who have died) or your time (number of "cycles"). In trying to figure out this game the first time, I have unsuccessfully saved the lives of 10 million out of 30 million people and have used 380 cycles. This is just about as bad as you can possibly do (you'll find out why).

In the meantime, watch for Poet on television, remember the lady or the tiger, beware of the Creators, don't flip upside-down and have fun. **C**

And Don't Forget These Favorites

More new releases for the Commodore 64 to light up anyone's Christmas!

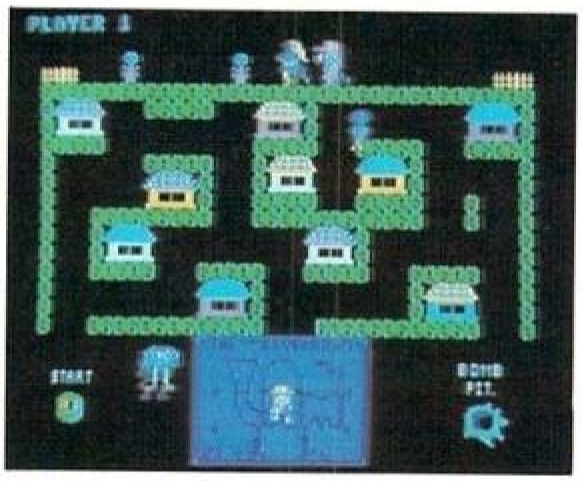


Lazarian (cartridge)

This Bally/Midway hit plays exactly like the arcade version that (up until now) has been sucking quarters out of your favorite 64er's pocket. The graphics are 64-ific, and the background music (Beethoven's Ninth and the William Tell Overture) positively inspiring.

In the first round you shoot all the meteorites and rescue your lander. Then you navigate the "Tunnel of Fear", inhabited by killer fish, aliens and gun emplacements. Finally you confront Lazarian himself—a kind of octopus-cyclops-pyramid with a deadly killer eye. Once you've conquered all that, you move on to increasingly difficult levels of play.

What makes this game even better than the arcades (aside from the fact that you don't have to feed it with quarters) is that it has a pause feature that lets you freeze the screen, go off and grab a snack, then come back and pick up again exactly where you left off. For the benefit of novice players it also has a reset feature so if you get wiped out in the first level of play you can reset the game and continue from where you got killed, instead of having to start all over.

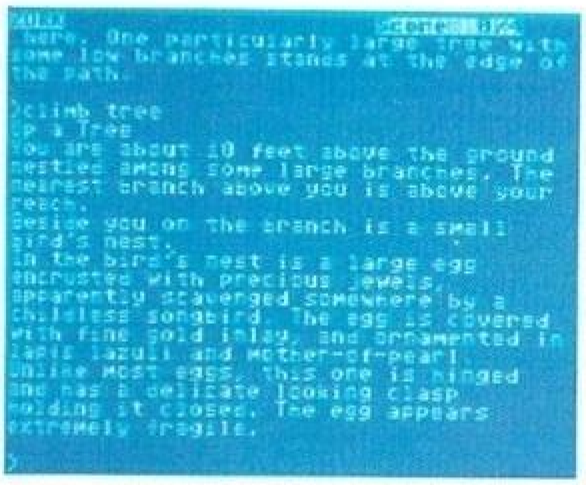


Blueprint (cartridge)

A terrific—not to mention slightly wacko—Bally/Midway game with a couple of twists that make it one of my favorites. The version for the 64 looks, sounds and plays just like the original arcade version.

The object is for a little guy in a straw hat to find all the pieces of a machine, put the pieces together following a "blueprint" at the bottom of the screen, and then use the machine to shoot the ogre that keeps chasing a gorgeous damsel across the top of the screen. He finds the pieces of the machine stored in ten little houses. The problem is that some of the houses contain bombs instead, which he then has to throw into a "bomb pit" way down at the bottom of the screen before they blow him to bits. And there's this mischievous monster named Willie who keeps trying to make the machine fall apart. And these killer flowerpots that keep falling off the ledge above...

If our hero succeeds, he gets the fair lady—and gets to start over again with less time, more bombs, more killer flowerpots—oh, boy isn't he lucky? If, however, he fails and the ogre catches the poor beleaguered (not to mention buxom) damsel, our hardworking little friend dies of a broken heart and goes to heaven, complete with halo. (This is a just reward?)



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here. One particularly large tree with
some low branches stands at the edge of
the path.

>climb tree
Up a Tree
You are about 10 feet above the ground
nestled among some large branches. The
nearest branch above you is above your
reach.
Beside you on the branch is a small
bird's nest.
In the bird's nest is a large egg
encrusted with precious jewels,
apparently scavenged somewhere by a
childless songbird. The egg is covered
with fine gold inlay, and ornamented in
lapis lazuli and mother-of-pearl.
Unlike most eggs, this one is hinged
and has a delicate looking clasp
holding it closed. The egg appears
extremely fragile.

>
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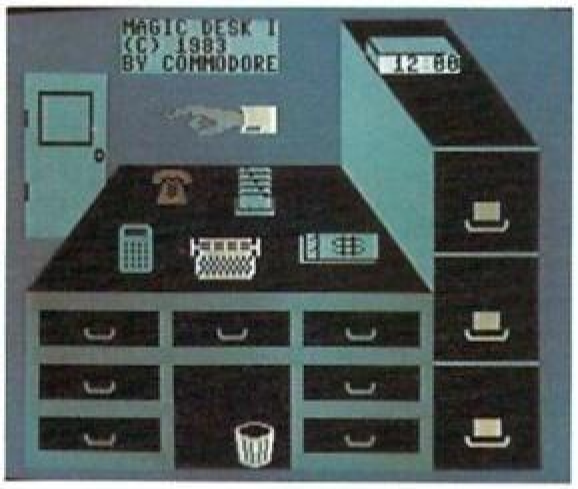
More INFOCOM Adventure Games on Disk: The Zork Trilogy, Deadline, Starcross

In addition to *Suspended*, Commodore also has five other mind-bending adventures from INFOCOM for the Commodore 64. The three *Zork* games take you on quests through magical worlds seeking treasures, fighting dragons and conquering wizards. But watch out for the bats!

In *Deadline* you are the police inspector assigned to investigate the murder of wealthy Marshall Robner. Was it Robner's wife? His business partner? Or perhaps his spoiled and hostile son? You have twelve hours to gather evidence and make an arrest.

Starcross takes you into space, navigating a mining craft. You dock at an asteroid—but what an unusual asteroid. What is this odd looking sculpture here on the docking port? Explore all the possibilities. Can you escape with your life before your oxygen runs out?

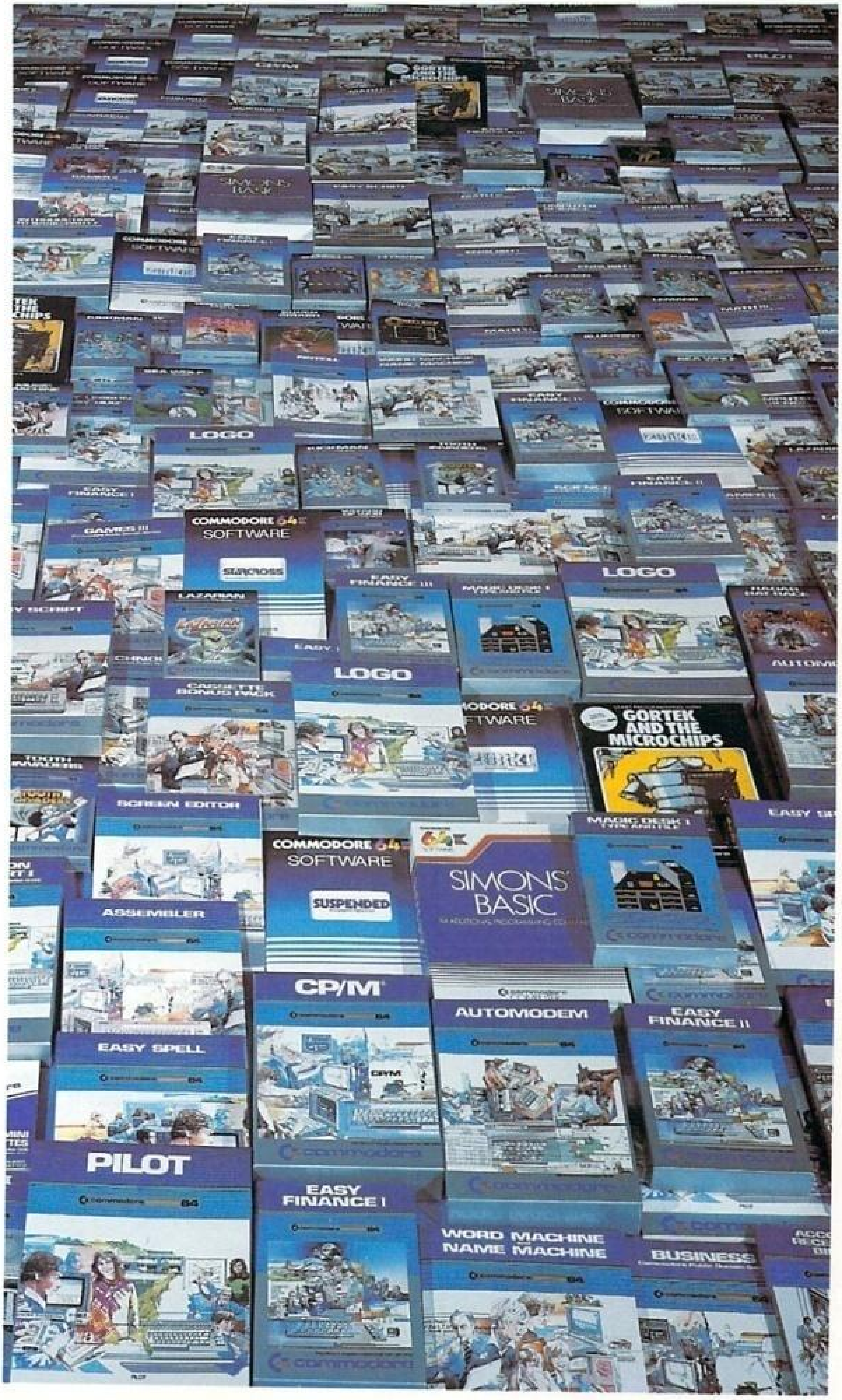
All the INFOCOM adventures for the Commodore 64 have large vocabularies, so you have great flexibility for asking questions and giving commands. They also have a weird sense of humor, so be prepared.

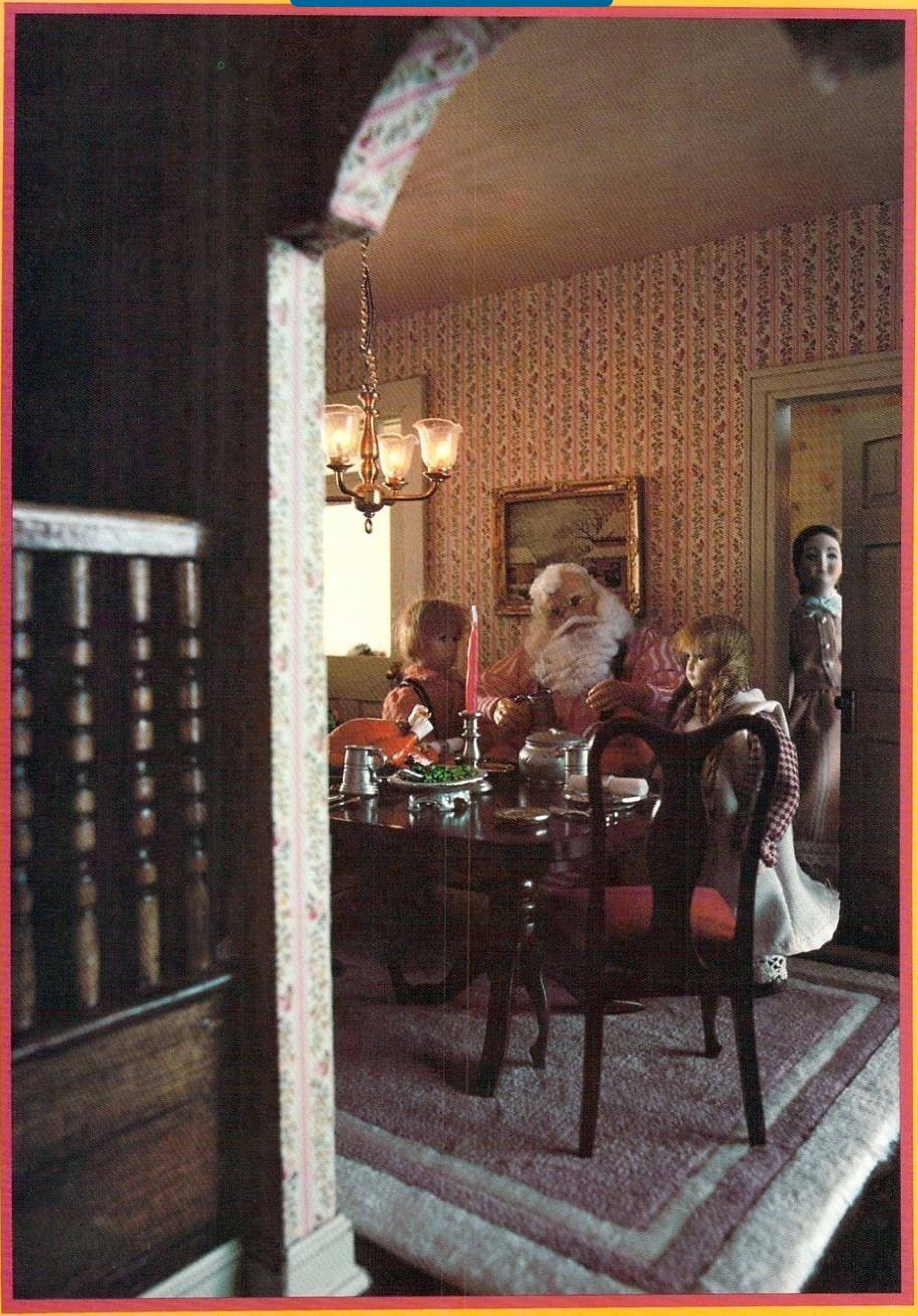

MAGIC DESK I
(C) 1983
BY COMMODORE
12 00

Magic Desk (cartridge)

Make yourself comfortable in Commodore's animated office, where you can do office work that feels like play. The first in the *Magic Desk* series provides a friendly word processor that looks and sounds like a conventional typewriter and a filing system for storing and retrieving documents, all in a "real" office that's created graphically on your computer screen. You even have a wastebasket and a working clock. Use the friendly flying finger controlled by your joystick to choose the function you want, whether it's typing a document, printing it out, filing it or throwing it away.

Additional *Magic Desk*s are on the way, with calculation and financial capabilities, an artist's easel for creating graphics—and who knows what else. **C**

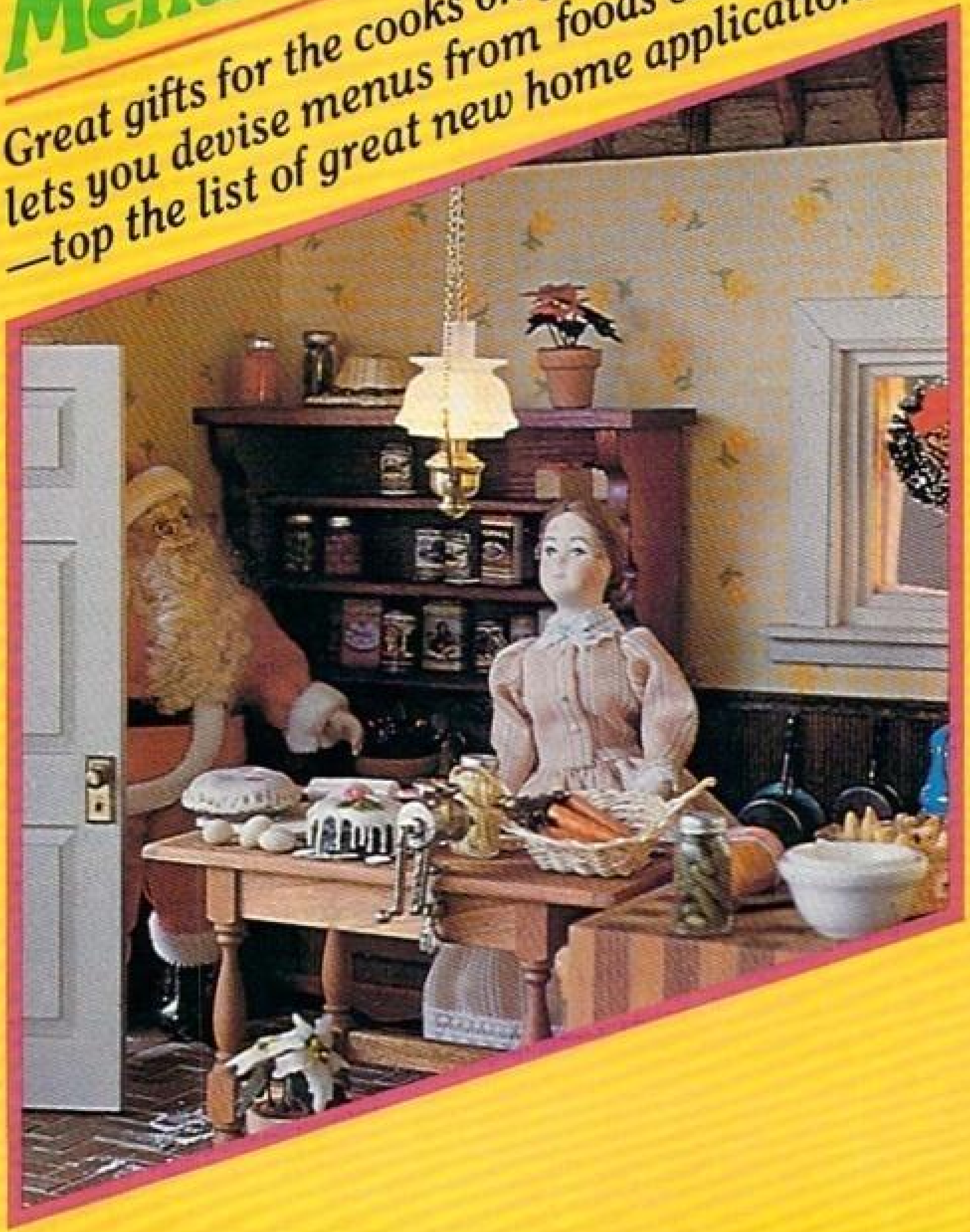

LOGO
COMMODORE 64 SOFTWARE
STARCROSS
LAZARIAN
EASY FINANCE III
GAMES III
CASSETTE BONUS PACK
GORTEK AND THE MICROCHIPS
MAGIC DESK I
SCREEN EDITOR
SUSPENDED
SIMONS' BASIC
ASSEMBLER
CP/M
AUTOMODEM
EASY FINANCE II
EASY SPELL
PILOT
EASY FINANCE I
WORD MACHINE NAME MACHINE
BUSINESS
commodore



Home Applications Software For The VIC 20 And Commodore 64

The Micro Cookbook Menu Planner

Great gifts for the cooks on your Christmas list— a cookbook for the 64 that lets you devise menus from foods on hand and a menu planner for the VIC —top the list of great new home applications software from Commodore.



The Micro Cookbook

There's Something Good Cooking at Commodore...

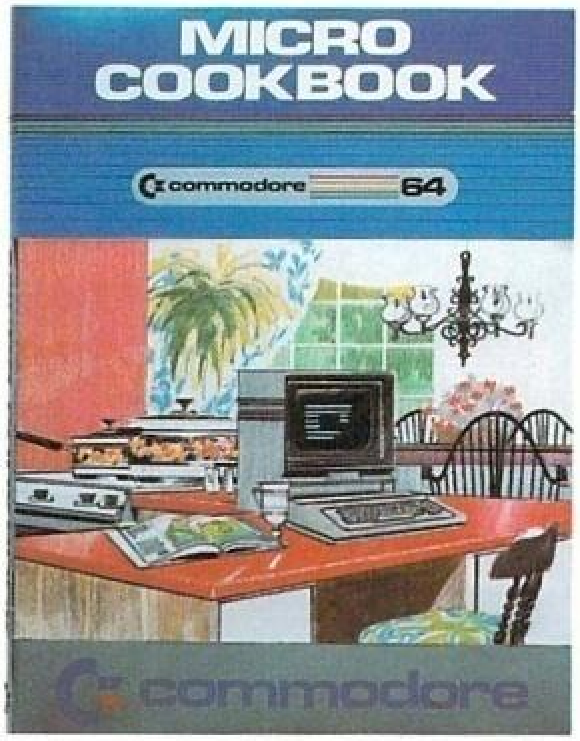
By April M. Koppenhaver

From its inception Commodore has been committed to designing and marketing fresh new ideas. One of our latest delectables, the *Micro Cookbook,* is a piping hot software package for the Commodore 64. Hosting over 150 international, tantalizing, savory favorites, the *Micro Cookbook* is now ready to be your computerized kitchen consultant.

The *Micro Cookbook* is the computer age solution to home information management. Just to whet your appetite, the *Micro Cookbook* provides you with a smorgasbord of easy, fast, reliable ways to:

- Enter, modify, store, search and retrieve your recipes
- Select a recipe by ingredients on hand
- Prepare shopping lists
- Print your favorite recipes
- Access important nutritional and cooking information
- Automatically adjust recipes for a specific number of servings

Great for singles, families and party planners, the *Micro Cookbook* lets you store hundreds of your culinary creations on disk. The *Micro Cookbook* can list the dessert recipes using a certain fruit that is in season or tell you the number of calories in a serving of strawberry cheesecake. The *Micro Cookbook* can double your favorite recipe for tonight's sukiyaki or even give you a definition of stir fry. How's that for versatile?



When you begin the *Micro Cookbook,* a "main menu" appears on the screen, which lists a feast of functions that can be performed. Simply enter the name of the desired recipe or the number associated with the function you want your *Micro Cookbook* to perform. Sounds simple doesn't it? And the results are sensational! In fact, the *Micro Cookbook* is entirely menu-driven. That means the program displays the choices and all you have to do is select the one you want.

The *Micro Cookbook* can search and retrieve your files very quickly. The secret ingredient is the way the program manages your recipe data. It maintains several indices in order to do this. There's an index for recipes, ingredients and recipe classifications. Each index lists the selections that are available.

For example, by entering a "0" at the main menu you can obtain an index of recipes that are stored on your recipe disk. Because you can store hundreds of recipes on a disk, the cookbook lists a maximum of 32 names on the screen at a time. To review the next set of recipe names, simply press the RETURN key. Enter "1" to review the index of ingredients or "2" for classifications. Also, if you prefer to see the selections in alphabetical order, specify the sorting option. Then your *Micro Cookbook* and Commodore computer will do it all for you.

Here's more food for thought. To access a specific file, you can type in a recipe name (chile con carne), ingredient(s) (ground beef), and/or classification (mexican). Another alternative is to scan the index screens and simply move the cursor to the location of your choice. Press CTRL-C and the information you wanted will be displayed. This "point select" method is easier than typing!

If this isn't enough to make you indulge, this easy-to-use kitchen consultant also features a glossary of cooking terms, calorie/nutrition guides, a table of measurements and equivalents, a table of ingredient substitutions and food buying, storing and cooking tips. Drooling? Tempted? Don't go hungry. Get those juices flowing and call your local dealer today. The time is ripe to ask for your special take-home order of Commodore's *Micro Cookbook.* Also, be sure to make reservations for your friends and relatives. **C**

Tickle Your Tonsils with
Robert Carrier's Menu Planner for the VIC 20

By Walter Lounsbery

Do you have trouble setting up dinner for relatives? Even after thinking hard for hours the only recipes you can remember are the ones that don't work, because they got the most spectacular results? Does cooking at home seem to have degenerated to TV dinners and cold sandwiches? Well, if you would like to throw away some moldy habits or just add some spice to your life, your friendly VIC 20 and *Robert Carrier's Menu Planner* may curry the day.

Robert Carrier's Menu Planner is a British program intended for the VIC 20 with at least 8K bytes of memory expansion and the Commodore datassette. The program manages a list of 120 dishes and 20 wines. The program comes with a data tape containing a suggested list of dishes and wines selected by Robert Carrier, a well-known British food person. The recipes for these dishes are contained in four cookbooks that are listed in the program manual.

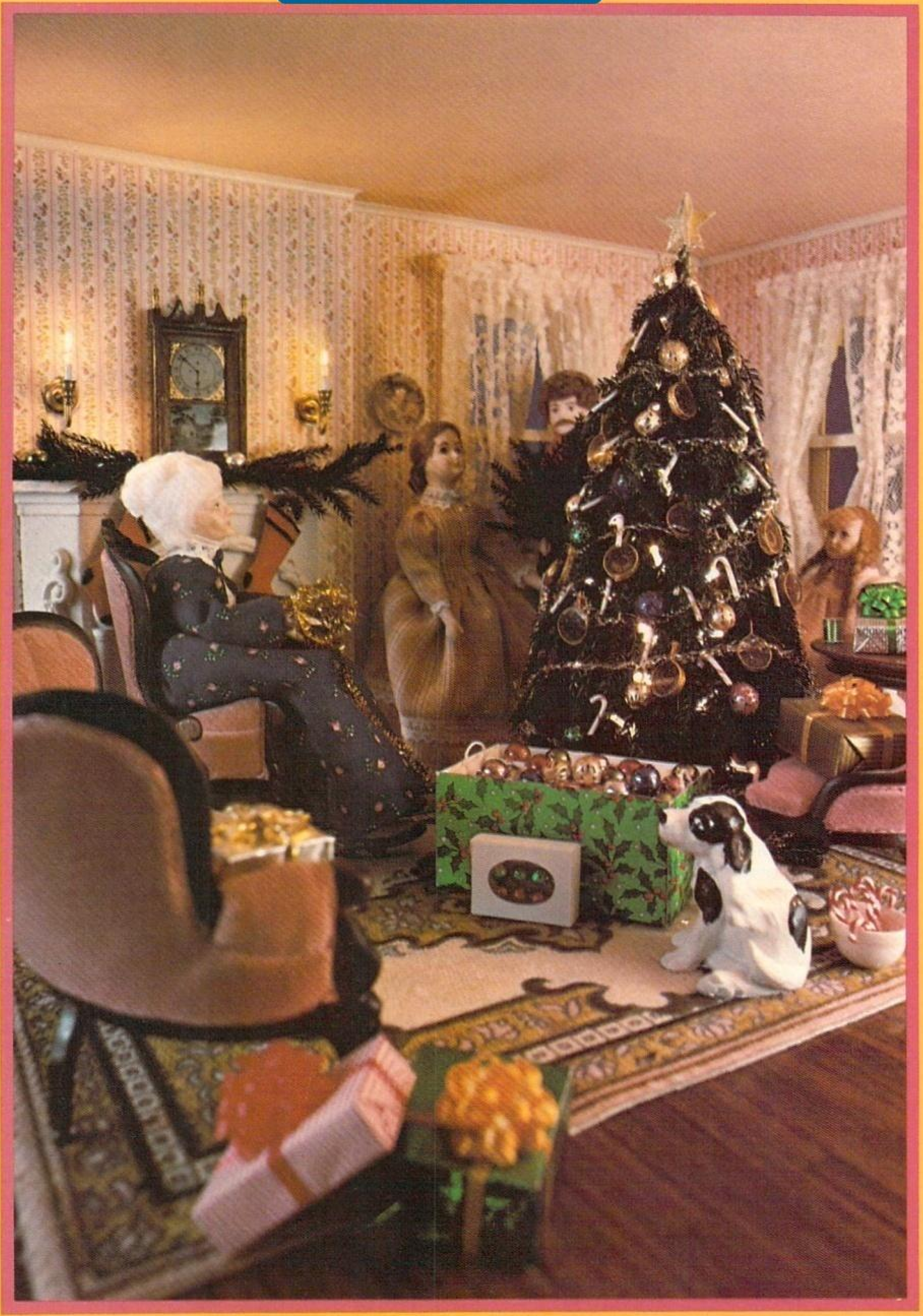
VIC 20
COLOUR COMPUTER
cassette
SOFTWARE
commodore
COMPUTER
ivan berg
SOFTWARE

It is also possible to make a customized list of dishes and drinks that might fit your lifestyle better. This does not have to be limited to ordinary cuisine, either. At my house we are always having trouble figuring out what the cats were served last. Even if we forget, they always know if they are served leftovers. Now it is possible to make up a special gourmet kitty database, with Kitty McNuggets, Rabbit Chitlins or Beef Cuts in Beef Gravy. As for ourselves, we could put several "surprise" selections in the list such as "other spouse cooks" or "fast food" or "fine dining". In the first case the VIC gets to excuse the current cook for the day and in the last two nobody has to cook, much less clean up the dishes.

This brings us to discuss what the program does with its list of dishes and drinks. Actually, that is only a small part of the database. The program can also keep a list of guests at parties, the date of the party and what was served. The program can save (remember) 30 to 60 names depending on the memory expansion of the computer, although only eight per party can be handled. Therefore, the menu planner can keep track of three things for you, dishes and drinks, party dates and guests.

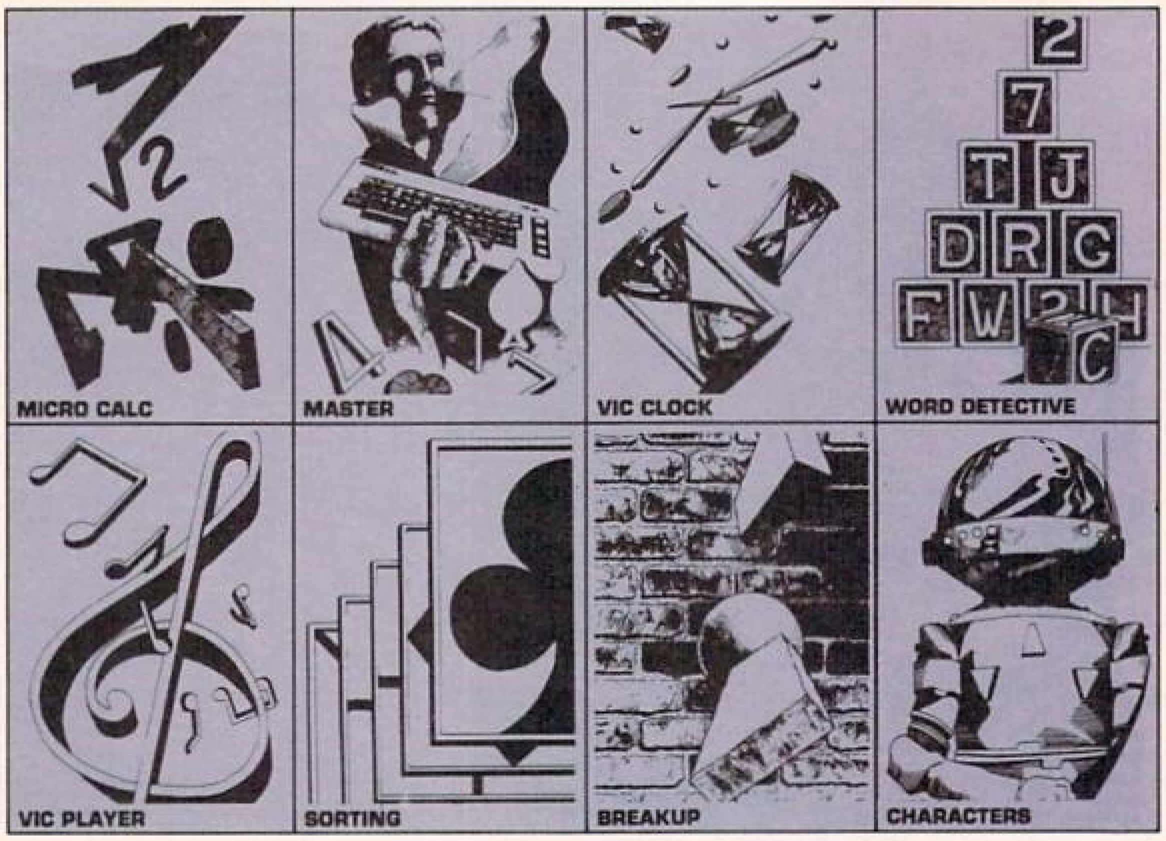
It might be seen that the menu planner program actually does quite a lot. With the aid of an explicit, step-by-step manual and good use of screen MENUS (well, that is what they are called!), the first-time user is able to exercise his/her diet in short order. There are very few points that can be criticized, and none major enough to talk about. The program can even select dishes and drinks for you, subject to your approval. If you are holding a party, it can also help select your guests and review what you served at recent parties (and who got it) in order to vary the menu. The use of a program like this could help a person a lot.

It would be unfair to close without suggesting ways to improve the program. A disk-based version would be nice, with the possibility of more guests per party. Of course, in the coming age of computers, it will soon be possible to have a program that will call up the people on the guest list and invite them over. This would eliminate a tedious chore and let your computer get all the rejection. Because, you see, it might be possible that your computer will be calling your guest's computer. And your guest's computer will remember how you burned what you served the last time! **C**



Books Make Great Christmas Gifts

The newest addition to Commodore's line of friendly computer books will help your favorite VIC 20 owners master their computer.



Mastering Your VIC 20

By Phil Daley, Robert Tripp and Loren Wright.
Published by Commodore in conjunction with
Micro Ink.

Reviewed by Jim Gracely

If you want to become a programmer or you just want to understand how and why programs work, this may be the book for you. This book walks you through eight chapters of programs. Each chapter is based on one particular program and may include a number of shorter programs. There are chapters on music, sorting, word games, breakup games, programmable characters and even clocks.

Each chapter begins with a discussion of what the program does or what it is for. This is followed by operating instructions for the program, complete with a picture of the screen display. The next section in the chapter explains how to use the program. This is a look at the program from the "outside" or from the user's point of view.

Once this material has been presented, the program itself is explained. First there is a list of all the variables used in the program. This is followed by the program listing itself, which is supplemented with a good detailed explanation. The explanations are not always line-by-line but rather a section-by-section description of how the program works. In the first chapter, "VIC Player" (a piano program), there are three pages of program listing and four pages of documentation.

The next portion of each chapter discusses the programming concepts used within the program. This is the place where a beginner can pick up the techniques of program writing. All of the concepts used in the program are explained here in much detail. For instance, in the first chapter this section explains making selections from a menu, the differences between integers and floating point numbers and the INT (integer) function. In the chapter titled "Breakup" (a game) the concepts in the second section include reading the joystick port and the paddle port.

In general the book progresses from simple concepts through some very difficult concepts in the multi-color programmable character section. The concepts presented in each chapter are used within the following chapters, which allows the programs to become progressively more complex. This also allows the programmer to progressively increase his knowledge and understanding.

There are two additional very strong features of this book. The first is that the book comes with a cassette tape containing all the programs. This is nice for more reasons than reducing the frustration of typing in a long program. Personally, I can't get excited about learning how a new program works without using it first. Whether the program is a game or spreadsheet I like to see what features would be a challenge for me to figure out. Once I am impressed with the program I am willing to sit down and examine how and why it works.

The second strong feature of this book is that the programs included are the type to impress you. There are a number of very nice programs here, which are original in both their concept and approach. The game of "Master" is similar to the peg games on the market, except that this version will do all of the work for you. The "VIC Clock" is a digital alarm clock with BIG numbers and settings for the time and the alarm. The "Bar Sort" program actually displays 20 bars of random lengths as they are being sorted by any one of five sorting methods. "Micro Calc" is a miniature spreadsheet program. It allows ten lines of data to be processed at once and with modifications (included in text) allows 20 lines.

There are bound to be a few people out there in VIC land who would turn up their noses at this book and say "I already know how to do all of that!" but I'm sure not one of them. **C**

VIC GRAPH
Stimulatin Simulatin
VIC REVEALED

More Books for the VIC 20 from the Commodore Christmas Bookshelf

There's no such thing as too much information about your favorite computer. That's why Commodore's four-book package for the VIC 20, published in conjunction with Hayden Books, will be a special treat for any VIC 20 owner.

The package contains four time-tested favorites by topnotch authors: *Stimulating Simulations for the VIC* by C. W. Engel and three from the well known British VIC expert Nick Hampshire, including *VIC Revealed, VIC Games* and *VIC Graphics*.

All four books provide practical programming advice and exciting programs with clear explanations. Each book gives the VIC user a more thorough understanding of the VIC's capabilities and hands-on experience in creating all kinds of effects on the wonder computer.

If you like to get (or give) your information right from the source, then books from Commodore are the obvious choice. **C**

commodore
F.D
CHIEF

New Hardware: The 1701 Color Monitor From Commodore

If you think the graphics on your VIC or 64 look good on a T.V., you ain't seen nothin' yet. Wait until you see them on Commodore's 1701 color monitor, whose circuits are designed specifically to show off your computer's graphics to the utmost.

By Danny Byrne

The 1701 color monitor recently introduced by Commodore was a pleasant surprise and a welcome addition to our family's computer system. It wasn't too long ago that I faced a small lynch mob because I decided I needed to use the family color TV during prime time. After a few close encounters like that (more accurately, out-right battles) the rest of the family decided that we needed another color television.

We shopped around, compared prices and features and had almost decided on a popular brand that was conveniently on sale, when we learned that Commodore had a color monitor that performed wonders with the picture on the Commodore 64.

I called a family conference, and *almost* everyone was all for buying the 1701 monitor, particularly since the price ($299.00 list) was less than we had planned on paying for the color TV. The one hold out was our 14 year-old daughter, Beth. Her objection was, "If you can't watch 'Fame' or 'Family Ties' on it, it's not worth buying at any price!".

Of course her objections were overruled (she was outnumbered when we put it to a vote) and when I brought the 1701 home and Beth saw the quality of the video display with her favorite Commodore video game, I heard no more of that "television nonsense" (or so I thought!).

My wife Betsy, sympathetic

to Beth's plight (she always *has* spoiled that kid) called up the salesman at the place we bought the monitor and asked if there might be a way to interface it with our ancient RCA video cassette recorder and use it as a television set. Her reasoning was that since the VCR contains a television tuner, and when we watch TV through the VCR we are only using the picture tube and the speakers, that it *should* be possible to access the 1701 monitor in the same fashion.

The salesman told Betsy that he had never thought about it, but it did sound logical. He asked her to let him know the outcome of our experiment. Armed with this "expert" confirmation of her idea, Betsy joined forces with Beth to confront me. I was skeptical at first, but they convinced me to give it a try.

The first thing I had done when I bought the 1701 was make a cable to hook our 64 up to the rear connection, on the advice of Jim Butterfield and other 64 owners who had tried it (more on this in a minute). This left the front hook-ups free for connecting to our VCR.

I used two RCA cables with pin jacks and plugged them into the video-out and audio-out on the VCR. (These are standard 75 ohm RCA plugs, available just about anywhere for around $3.) This procedure not only worked, but gave the Byrne family an auxiliary color TV set that had better color, sound and resolution (in our opinion) than any of the "real" televisions we had considered buying!

I also found that I could go one step further and feed signals from the computer into the audio/video-in jacks on the VCR, which passes the signal through to the monitor. This enables me to record graphics and sound from the 64 on video tape, just like some of the impressive computer graphics and sound exhibitions you may have seen on television.

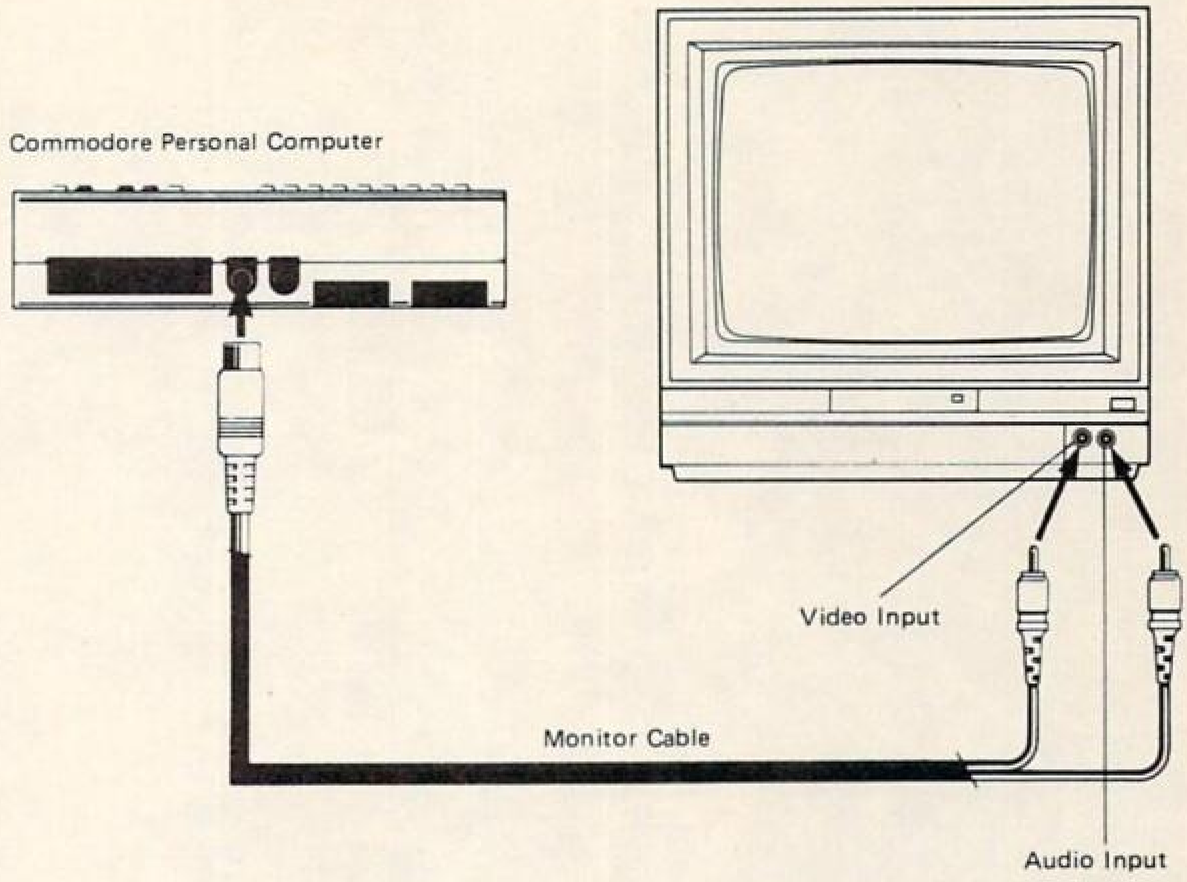
Beth's prime time problems and Betsy's intuition had resulted in an entire modular home learning and entertainment center consisting of our Commodore 64, 1701 color monitor, the video cassette recorder and our stereo system (hooked up to the 64 monitor cable's audio-out plug). I would venture a guess that some kind of matching system containing these components (and maybe some that I haven't thought of—laser disk?) will be the norm in the homes of the very near future.

The real reason I (not Beth) had wanted to buy the 1701 was the excellent color and resolution that I had seen demonstrated at the Commodore dealer. In the 1701 my hopes for really showing off my 64's graphics had crystalized into reality, but to obtain the *best* display, as I mentioned, I did have to build my own cable to connect my Commodore 64 to the rear hook-up on the 1701.

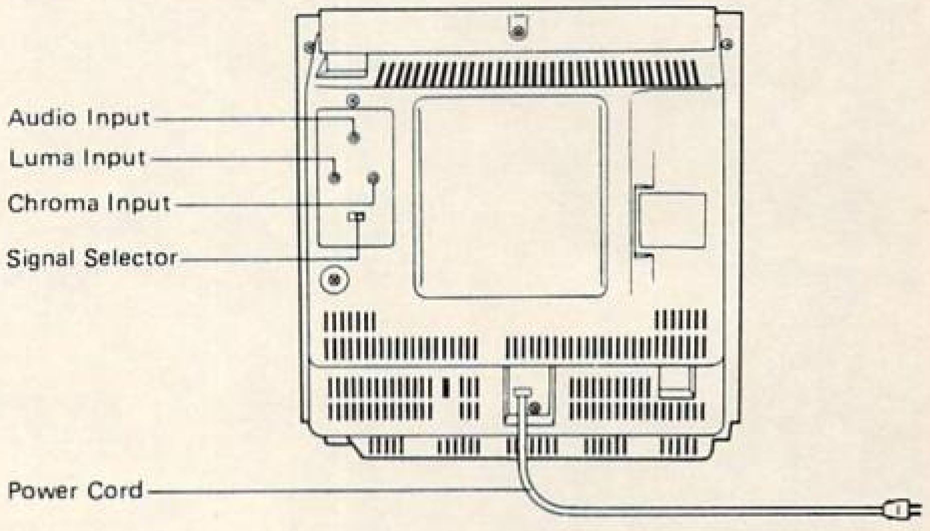
According to the manual that comes with the 1701: "The use of this terminal (rear hook-up) allows the display of a picture with better resolution than the ordinary connection...". If anything, this is an understatement, but the manual forgets to mention that the cable for this connection is not included. I know several people, not being forewarned, who searched for the "other cable" in the monitor box and packings with (predictably) disappointing results.

Let me again say—the rear hook-up cable is not included. Although I understand that some electronic stores carry a ready-made cable that fits the bill for around $10, I couldn't find one in Albuquerque, so I built my own with parts costing less than $5. However, if you are not inclined to whip out your soldering gun and start sticking wires and plugs together, what you need to do is go to your local computer or electronics store and get a five-pin DIN-to-three-RCA plug designed to go from computer to monitor. If you can't find one ready-made, you might ask your dealer to make one for you.

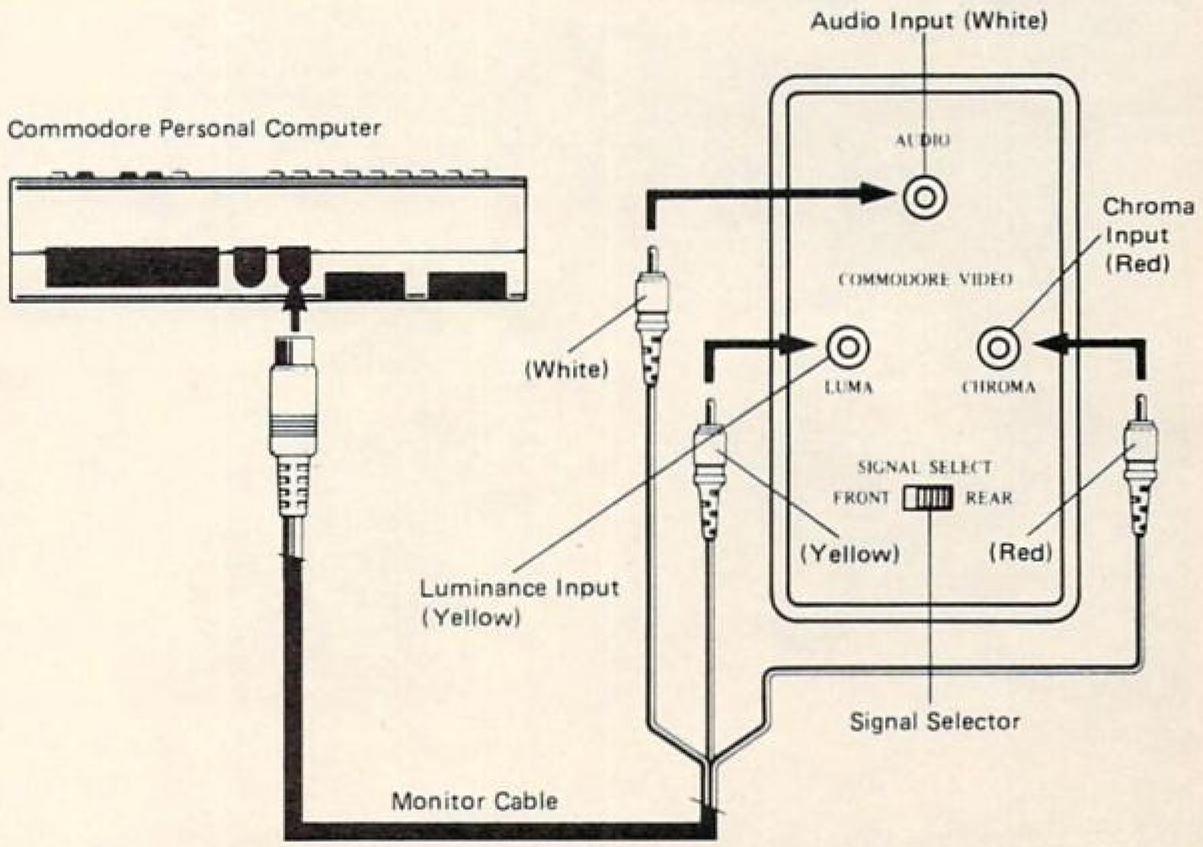
The manual that comes with the 1701 Commodore color monitor is short (ten pages) but to the point. I find it very useful and easy to understand, with excellent drawings and diagrams (some are included as illustrations for this article). In an age of indecipherable hardware manuals, this is no mean feat! One of the things my wife likes best about the monitor (believe it or not) is the fact that it matches the 64 and the 1541 disk drive. Together they make a handsome system that no one could mistake for anything less than a *real computer.*


Commodore Personal Computer
Video Input
Monitor Cable
Audio Input

1. *The Commodore 1701 color monitor comes with a cable that plugs into the front. The display is excellent using this configuration.*


Audio Input
Luma Input
Chroma Input
Signal Selector
Power Cord

2. *For the best possible display, connectors are available in the back of the monitor.*


Audio Input (White)
Commodore Personal Computer
AUDIO
Chroma
Input
(Red)
COMMODORE VIDEO
(White)
LUMA
CHROMA
SIGNAL SELECT
FRONT
REAR
(Yellow)
(Red)
Luminance Input
(Yellow)
Signal Selector
Monitor Cable

3. *Use a special five-pin DIN-to-three-RCA plug, available at computer dealers and electronics stores, to access the rear connectors.*

TOOTH INVADERS
PINBALL SPECTACULAR
CLOWNS
STAR RANGER
SPEED/BINGO MATH
MUSIC MACHINE
BLUEPRINT
LAZARIAN
VIC 20
SIMPLICALC
3+1=4
commodore

More Commodore Products

"And so," *said the Cat in the Hat,*
"So
so
so . . .
I will show you
Another good game that I know!"
—The Cat in the Hat by Dr. Seuss

Browse here for even more great ideas for Christmas giving.

Order Number	Product Name and Description
Commodore Consumer Range—VIC Series	
	VIC 20™ Full-featured, expandable color computer system. 5K RAM, includes RF Modulator & TV switch box.
Commodore Personal Computer Range—64 Series	
	Commodore 64™ 64K RAM personal computer features 16 colors, music synthesizer, high resolution graphics, (320 × 200 pixels), 8 movable sprites, and CP/M* option. Provides access to 2 joysticks, 4 paddles or a light pen. Display: 40 column × 25 lines
Commodore Personal Computer Range—4000 Series	
	PET® 4032N System includes graphic keyboard and numeric keypad; Display: 40 column × 25 lines; 32K RAM
Commodore Business Computer Range—8000 Series	
	CBM® 8032B Typewriter style keyboard, numeric keypad, 80 column × 25 line display. 32K RAM, BASIC 4.0.
	CBM 64K Memory Expansion Board 64K Add On-Memory. Expands CBM 8032 to 96K RAM.
	Upgrade Board Upgrades CBM 8032 to SuperPET
Commodore Advanced Computer Range—9000 Series	
	SuperPET™ Computer SP9000 Enhanced 8032 with additional 6809 microprocessor; total 134K memory with 96K RAM. Languages include Waterloo microBASIC, Waterloo microAPL, Waterloo microPASCAL, Waterloo microFORTRAN, Waterloo microCOBOL, interpreters and Waterloo 6809 Assembler.

*CP/M is a Registered TradeMark of Digital Research, Inc.

Order Number	Product Name and Description
Commodore Systems Peripherals—Disk Drives	
VIC 1530 (C2N)	**Datassette** Cassette storage for PET/CBM/VIC/C64
VIC 1541	**Single Disk** Single drive intelligent 5¼" floppy disk system for the VIC 20 and Commodore 64. Media compatible with CBM 2031 and 4040 diskettes. (170K)
CBM 2031	**Single Disk** Single drive intelligent 5¼" floppy disk system. 170K (DOS 2.6).
CBM 4040	**Dual Drive** Dual drive intelligent 5¼" mini-floppy disk system. 340K (DOS 2.1).
CBM 8050	**Dual Drive** Dual drive intelligent 5¼" mini-floppy disk dystem. 1 Megabyte (DOS 2.5).
CBM 8250	**Dual Drive** Dual drive intelligent 5¼" floppy disk system. 2.1 Megabyte, dual sided (DOS 2.7).
D9060	**Hard Drive** 5¼" "Winchester" drive (DOS 3.0) 5.0 MB
D9090	5¼" "Winchester" drive (DOS 3.0) 7.5 MB

All Commodore disk units feature compatible DOS command language and file handling capabilities to allow upward expansion of systems as required.

Order Number	Product Name and Description
Printers	
VIC 1525	**Graphic Printer** VIC dot matrix printer for the VIC 20 and Commodore 64. 30 CPS, 80 column; prints full VIC character set; tractor feed.
CBM 4022	**Printer** Dot matrix printer with tractor feed, 80 column, prints full PET graphics, variable line spacing, bi-directional, 80 CPS.
CBM 8023P	**Printer** Dot matrix printer with tractor feed, 136 column. Fully programmable graphics, bi-directional, pseudo letter quality, 150 CPS.

Order Number	Product Name and Description
CBM 8300P	**Printer** True letter quality, daisy wheel printer with 10, 12, 15 pitch or proportional spacing and optional tractor feed. Bi-directional; 40 CPS; supports APL & foreign language print wheels.

Cables

	IEEE-IEEE Designed to connect more than one peripheral to any PET/CBM computer.
	PET-IEEE Used for connecting one peripheral to any PET/CBM computer.

Accessories

CT 500	**Commodore Computer Desk** 26″ × 1⅛″ T-molding with rounded corners; heavy steel legs with adjustable leveling glides; typewriter height with a ventilated shelf for the disk drive.
VIC 1311	Joystick for VIC 20 and Commodore 64
VIC 1312	Paddles for VIC 20 and Commodore 64
VIC 1600	**VICMODEM** Telephone Interface Cartridge. Lets VIC 20 & Commodore 64 owners communicate by telephone, access telecomputing and timesharing service. Includes terminal software on tape. Plus FREE CompuServe Subscription.
VIC 1525	**Printer Paper** 1000 Sheets

Peripheral Compatibility...
CBM Peripherals can be used with the PET, CBM, and SuperPET range of computers, and also with the VIC 20 and Commodore 64 computers if a special IEEE cartridge is purchased.

VIC Memory Expansion Cartridges

VIC1110	**VIC 8K Memory Expander Cartridge** 8K RAM expansion cartridge plugs directly into the VIC.
VIC1111	**VIC 16K Memory Expander Cartridge** For use with the VIC 20.

Order Number	Product Name

VIC Interface Cartridges

VIC1011A	**RS232 Terminal Interface** Provides interface between the VIC 20 & C-64 and RS232 telecommunications modems. Connects to the VIC's & 64's user port.

Applications Software for PET/CBM

400020	Assembler Development—8050
400021	Assembler Development—4040
400030	Integer Basic Compiler—8050
400031	Integer Basic Compiler—4040
400040	CMAR Record Handler
400050	UCSD Pascal (Without Board)—8050
400051	UCSD Pascal (Without Board)—4040
400060	PETSpeed Basic Compiler—8050
400061	PETSpeed Basic Compiler—4040
500010	OZZ—8050
500011	OZZ—4040
500039	Dow Jones Portfolio Management System (80 Col. RS232)
500041	BPI Accounts Receivable
500049	BPI Accounts Payable
500043	BPI General Ledger—8050
500045	BPI General Ledger—4040
500046	BPI Job Cost
500047	BPI Inventory
500048	BPI Payroll
500050	Legal Time Accounting
500051	Medical Accounting System
500052	Atlas 1200 Service and Maintenance
900040	I.R.M.A. II (Information Retrieval & Management Aid)

VIC 20 Software

VIC Business Series

VIC-2001	Simplicalc (Disk)
VIC-2002	VIC File (Disk)
VIC-2003	VIC Writer (Disk)
VIC-2004	Money Decisions I (Tape)
VIC-2005	Money Decisions II (Tape)

VIC Home Information Series on Disk

VIC-3001	Quizmaster
VIC-3002	Know Your Child's IQ
VIC-3003	Know Your Own IQ
VIC-3004	Know Your Personality
VIC-3005	Menu Planner

Order Number	Product Name

VIC20 Recreation Games on Cartridge

Video Arcade Series

VIC1901	VIC Avenger
VIC1904	SuperSlot
VIC1906	Super Alien
VIC1907	Jupiter Lander
VIC1908	Draw Poker
VIC1909	Road Race/Midnight Drive
VIC1910	Radar Rat Race
VIC1913	Raid on Fort Knox
VIC1919	Sargon II Chess
VIC1920	Pinball Spectacular
VIC1921	Super Smash
VIC1922	Cosmic Cruncher
VIC1923	Gorf*
VIC1924	Omega Race*
VIC1925	Money Wars
VIC1931	Clowns*
VIC1937	Sea Wolf*
VIC1938	Tooth Invaders
VIC1939	Star Post

Scott Adams Adventure Games

VIC1914	Adventure Land Adventure
VIC1915	Pirate Cove
VIC1916	Mission Impossible Adventure
VIC1917	The Count
VIC1918	VooDoo Castle

Children's Series

VIC1911	The Sky Is Falling
VIC1912	Mole Attack
VIC1928	Home Babysitter
VIC1930	Visible Solar System
VIC1933	Bingo/Speed Math
VIC1935	Commodore Artist
VIC1941	Number Nabber

Home Improvement Cartridges

VIC1929	Personal Finance

VIC Programming Aid Cartridges

VIC1211A	VIC 20 Super Expander
VIC1212	Programmers Aid Cartridge
VIC1213	VICMon Machine Language Monitor

Order Number	Product Name

VIC Teach Yourself Programming Series

VL102	Introduction to BASIC Programming—Part I (Tape and book)
VL103	BASIC Programming—Part II (Tape and book)
VL110	GORTEK and the Microchips (Tape and book)
VIC1001	Waterloo BASIC (Disk)

VIC Application Programs on Tape

The following pre-recorded programs are designed for use with the Commodore Datassette tape recorder. Programs on tape come in several varieties and are color coded by category as follows: Recreation (red), Education (blue), Business Calculation (green), Home Utility (orange), and Computing Aid (black).

VT106A	Recreation Program Six Pack
VT107A	Home Calculation Program Six Pack
VT108	Math Improvement Six Pack (grades 2-6)
VT109	Sampler Six Pack
VT164	Programmable Character Set/Gamegraphics Editor
VT232	Term 20/40—Terminal Emulator

Commodore 64 Software

Recreation Series on Cartridge

C64601	Jupiter Lander
C64602	Kickman*
C64603	Sea Wolf*
C64604	Bingo/Speed Math
C64605	Radar Rat Race
C64606	Clowns*
C64609	Visible Solar System
C64610	Tooth Invaders
C64612	Blueprint*
C64613	Lazarian*
C64614	Omega Race*
C64615	Wizard of Wor
C64616	Lamans
C64617	Pinball Spectacular
C64618	Gorf
C64621	Avenger
C64622	Super Smash
C64623	Star Post
C64624	Frogmaster
C64631	Star Ranger

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*Bally Midway Games developed under Commodore's licensing agreement with Bally Manufacturing Company.

Educational Public Domain on Disk

Order Number	Product Name
C64700	Business "BA"
C64701	Geography "RA"
C64702	English "EA"
C64703	English "EB"
C64704	English "EC"
C64705	English "ED"
C64706	English "EE"
C64707	English "EF"
C64708	English "EG"
C64709	Math "MA"
C64710	Math "MB"
C64711	Math "MC"
C64712	Math "MD"
C64713	Math "ME"
C64714	Math "MF"
C64715	Math "MG"
C64716	Math "MH"
C64717	Comp Sci "CA"
C64718	Science "SA"
C64719	Science "SB"
C64720	Science "SC"
C64721	Science "SD"
C64722	Tech "TA"
C64723	History "HA"
C64724	Games "GA"
C64725	Games "GB"
C64726	Games "GC"

Mind-Challenging Games From INFOCOM on Disk**

Order Number	Product Name
C64625	Zork I
C64626	Zork II
C64627	Zork III
C64628	Suspended
C64629	Starcross
C64630	Deadline

**INFOCOM games developed under Commodore's licensing agreement with INFOCOM, INC. INFOCOM is a registered trademark of INFOCOM, INC.

EASY Business Series on Disk

Order Number	Product Name
C64200	Easy Calc 64
C64210	Word/Name Machine
C64202	Easy Finance I 64
C64212	Easy Finance II 64
C64213	Easy Finance III 64
C64214	Easy Finance IV 64
C64215	Easy Finance V 64
C64204	Easy Mail 64
C64207	Easy Script 64
C64208	Easy Spell 64
C64216	The Manager

Small Business System Series on Disk

Order Number	Product Name
C64220	General Ledger
C64221	Accounts Receivable
C64222	Accounts Payable
C64223	Payroll/Check Writing
C64224	Inventory Management
C64225	Codewriter

Learning Series

Order Number	Product Name
C64303	GORTEK and the Microchips (Tape)
C64310	Easy Lesson/Easy Quiz 64 (Disk)

Programming Series

Order Number	Product Name
C64101	Assembler 64 (Disk)
C64103	Bonus Pack (Disk)
C64104	C64 Super Expander (VSP) (Cartridge)
C64105	LOGO (Disk)
C64106	Pilot (Disk)
C64107	PET Emulator (Disk)
C64108	Simons' BASIC (Cartridge)
C64109	Screen Editor (Disk)
C64110	CPM 2.2 Operating System***
C64111	Nevada COBOL (Disk)
C64301	Intro to BASIC I (Tape)

Art and Music Series

Order Number	Product Name
C64402	Music Machine (Cartridge)
C64403	Music Composer (Cartridge)

Telecomputing Series

Order Number	Product Name
VT232	Term 20/40 Software Terminal Emulator (Tape)

***CPM is a registered trademark of Digital Research, Inc.

MAKING FRIENDS WITH SID

PART 5

Paul started this series in the Winter, 1982, issue of Power/Play. *Those of you with the fortitude to have followed him all the way through are about to be rewarded with a lovely rendition of Bach's Prelude in C, played for you by your 64's Sound Interface Device (SID).*

By Paul Higginbottom

As I said at the end of the last article, this, the last in this series of articles, will add lines to our program to let us put a tune into the computer in DATA statements which the computer will READ and play when we RUN the program, instead of us playing a tune on the keyboard, as our program stands at present.

To do this, all we have to do is to change the program to read DATA statements instead of the keyboard and play the notes accordingly.

A logical format for the DATA is three numbers per note: octave, semitone and duration of the note. The modifications to this program will not allow three-part tunes to be played; it will simply be a modification to read the notes from DATA instead of our "typed" input, playing the notes in voices one, two and three, and then back to one, as explained in the last article.

LOAD the final program from the last article (see page 70 in this issue) and delete lines 700 to 760 (simply enter the line numbers and press RETURN). These lines were used to create an array of numbers corresponding to the ASCII codes of the keys in our keyboard layout, as well as to print the layout on the screen.

At the start of our tune DATA we'll have a "tempo" (the speed the notes will be played and read). So enter:

```
770 READ TEMPO
```

Our playing loop will replace some of the lines in the "playing" section (lines 800 onward).
Change line 800 to:

```
800 READ OCT,SEM,DUR:
IF OCT<0 GOTO 900:REM
READ NOTE AND EXIT
IF END
```

This line changes the note input from keyboard to DATA statements, and checks to see if it's reached the end of the tune, by seeing if the OCT[ave] variable is negative (that's how we'll mark the end of a tune in our DATA). It will branch to line 900 if the end is reached.

Delete lines 810 and 820, which used to work out the key position from the A$ input in the GET statement, and which we obviously no longer need.
Change line 830 to:

```
830 FRQ=F(OCT,SEM)
```

This simply changes the variable for the semitone subscript from KEY (which we no longer use) to SEM, the value of which was READ from the DATA in our new line 800. Lines 835, 840, 850, 860, and 870 will work just as they did before.
Enter:

```
875 FOR I=1 TO DUR*
    TEMPO:NEXT
```

This is our timekeeping line, which waits for the duration of the note (DUR) multiplied by our overall TEMPO (our first DATA value, read in 770).

```
900 FOR I=1 TO 1000:
    NEXT
910 POKE SID+24,0:END
```

Line 900 is branched to from line 800 when the end of the DATA is reached and it simply waits for approximately one second (an "empty" loop) to allow the last note to end. 910 turns off the volume because the tune has finished and the program ENDs.

We'll make line 1000 contain the tempo and lines 2000 onward the tune DATA, and add a line 9000 with the DATA containing a negative value for OCT to indicate the end of the tune (that gives us TONS of space for a tune!!). Thus, enter:

```
1000 DATA .5:REM TEMPO
9000 DATA -1,0,0:REM
     END OF TUNE
```

Don't faint when you see the next TON of lines; you don't have to enter them all. I went mad (how could I GO mad; I am, right?!) one night and worked out all the DATA for Bach's first Prelude. As the sun rose, I ran the program and it was (literally) music to my ears. You can enter as much of this DATA as you want but I'm sure that you'll want to hear the whole tune, as I did!

As I said at the start of this article, this is to be the last in my mini-series on the SID. If you've followed them from the first, hopefully you're now a little more aware of the capabilities of our friend SID.

Happy programming! **C**

Final SID Program

```
100 FR=3520:REM A IN TOP OCTAVE
110 CO=2^(1/12):REM CONSTANT MULTIPLYER FOR NEXT SEMITONE
120 FOR I=1 TO 9:FR=FR/CO:NEXT:REM START FR AT C BY GOING
     BACK 9 SEMITONES
130 SS=16777216:REM SID CLOCK
140 CS=1022730:REM CPU CLOCK
150 FC=SS/CS:REM FREQUENCY MULTIPLYING CONSTANT
200 DIM F(7,11):REM FREQUENCY ARRAY (OCTAVE, SEMITONE)
300 FOR I=0 TO 11:REM CYCLE THROUGH 12 SEMITONES
310 S=FR*FC:REM CALCULATE SID VALUE OF SEMITONE IN TOP OC
    TAVE
400 FOR J=7 TO 0 STEP-1:F(J,I)=S:S=S/2
410 NEXT:REM CALC VALUE FOR ALL 8 OCTAVES
420 FR=FR*CO:REM GO ONTO NEXT SEMITONE
430 NEXT:REM CONTINUE THROUGH ALL 12 SEMITONES
500 SID=54272
510 VOICE=0:OCT=3:WAVE=32
520 VM=7:HI=256
530 FOR I=0 TO 23:POKE SID+I,0:NEXT
540 POKE SID+24,15+16
550 READ A,D,S,R,PW,C,RE
560 FOR I=0 TO 2:INDEX=SID+I*VM
570 POKE INDEX+5,A*16+D
580 POKE INDEX+6,S*16+R
590 NEXT
```

```
 600 DATA 3,10,0,0,800,2000,15
 610 POKE SID+23,7+RE*16
 620 CH=INT(C/8):CL=C-CH*8
 630 POKE SID+21,CL:POKE SID+22,CH
 770 READ TEMPO
 800 READ OCT,SEM,DUR:IF OCT<0 THEN 900
 820 FRQ=F(OCT,SEM)
 830 FRQ=F(OCT,SEM)
 835 FH=INT(FRQ/HI):FL=FRQ-FH*HI
 840 INDEX=SID+VOICE*VM
 850 POKE INDEX,FL:POKE INDEX+1,FH
 860 POKE INDEX+4,WAVE:POKE INDEX+4,WAVE+1
 870 VOICE=VOICE+1:IF VOICE>2 THEN VOICE=0
 875 FOR I=1 TO DUR*TEMPO:NEXT
 880 GOTO 800
 900 FOR I=1 TO 1000:NEXT
 910 POKE SID+24,0:END
2000 REM MEASURE 1
2010 DATA 4,0,120
2020 DATA 4,4,120
2030 DATA 4,7,120
2040 DATA 5,0,120
2050 DATA 5,4,120
2060 DATA 4,7,120
2070 DATA 5,0,120
2080 DATA 5,4,120
2090 DATA 4,0,120
2100 DATA 4,4,120
2110 DATA 4,7,120
2120 DATA 5,0,120
2130 DATA 5,4,120
2140 DATA 4,7,120
2150 DATA 5,0,120
2160 DATA 5,4,120
2170 REM MEASURE 2
2180 DATA 4,0,120
2190 DATA 4,2,120
2200 DATA 4,9,120
2210 DATA 5,2,120
2220 DATA 5,5,120
2230 DATA 4,9,120
2240 DATA 5,2,120
2250 DATA 5,5,120
2260 DATA 4,0,120
2270 DATA 4,2,120
2280 DATA 4,9,120
2290 DATA 5,2,120
2300 DATA 5,5,120
2310 DATA 4,9,120
2320 DATA 5,2,120
2330 DATA 5,5,120
2340 REM MEASURE 3
2350 DATA 3,11,120
2360 DATA 4,2,120
2370 DATA 4,7,120
2380 DATA 5,2,120
2390 DATA 5,5,120
2400 DATA 4,7,120
2410 DATA 5,2,120
2420 DATA 5,5,120
2430 DATA 3,11,120
2440 DATA 4,2,120
2450 DATA 4,7,120
2460 DATA 5,2,120
2470 DATA 5,5,120
2480 DATA 4,7,120
2490 DATA 5,2,120
2500 DATA 5,5,120
2510 REM MEASURE 4
     (SAME AS 1)
2520 DATA 4,0,120
2530 DATA 4,4,120
2540 DATA 4,7,120
2550 DATA 5,0,120
2560 DATA 5,4,120
2570 DATA 4,7,120
2580 DATA 5,0,120
2590 DATA 5,4,120
2600 DATA 4,0,120
2610 DATA 4,4,120
2620 DATA 4,7,120
2630 DATA 5,0,120
2640 DATA 5,4,120
2650 DATA 4,7,120
2660 DATA 5,0,120
2670 DATA 5,4,120
2680 REM MEASURE 5
2690 DATA 4,0,120
2700 DATA 4,4,120
2710 DATA 4,9,120
2720 DATA 5,4,120
2730 DATA 5,9,120
2740 DATA 4,9,120
2750 DATA 5,4,120
2760 DATA 5,9,120
2770 DATA 4,0,120
2780 DATA 4,4,120
2790 DATA 4,9,120
2800 DATA 5,4,120
2810 DATA 5,9,120
2820 DATA 4,9,120
2830 DATA 5,4,120
2840 DATA 5,9,120
2850 REM MEASURE 6
2860 DATA 4,0,120
2870 DATA 4,2,120
2880 DATA 4,6,120
2890 DATA 4,9,120
2900 DATA 5,2,120
2910 DATA 4,6,120
2920 DATA 4,9,120
2930 DATA 5,2,120
2940 DATA 4,0,120
2950 DATA 4,2,120
2960 DATA 4,6,120
2970 DATA 4,9,120
2980 DATA 5,2,120
2990 DATA 4,6,120
3000 DATA 4,9,120
3010 DATA 5,2,120
3020 REM MEASURE 7
3030 DATA 3,11,120
3040 DATA 4,2,120
3050 DATA 4,7,120
3060 DATA 5,2,120
3070 DATA 5,7,120
3080 DATA 4,7,120
3090 DATA 5,2,120
3100 DATA 5,7,120
3110 DATA 3,11,120
3120 DATA 4,2,120
```

```
3130 DATA 4,7,120
3140 DATA 5,2,120
3150 DATA 5,7,120
3160 DATA 4,7,120
3170 DATA 5,2,120
3180 DATA 5,7,120
3190 REM MEASURE 8
3200 DATA 3,11,120
3210 DATA 4,0,120
3220 DATA 4,4,120
3230 DATA 4,7,120
3240 DATA 5,0,120
3250 DATA 4,4,120
3260 DATA 4,7,120
3270 DATA 5,0,120
3280 DATA 3,11,120
3290 DATA 4,0,120
3300 DATA 4,4,120
3310 DATA 4,7,120
3320 DATA 5,0,120
3330 DATA 4,4,120
3340 DATA 4,7,120
3350 DATA 5,0,120
3360 REM MEASURE 9
3370 DATA 3,9,120
3380 DATA 4,0,120
3390 DATA 4,4,120
3400 DATA 4,7,120
3410 DATA 5,0,120
3420 DATA 4,4,120
3430 DATA 4,7,120
3440 DATA 5,0,120
3450 DATA 3,9,120
3460 DATA 4,0,120
3470 DATA 4,4,120
3480 DATA 4,7,120
3490 DATA 5,0,120
3500 DATA 4,4,120
3510 DATA 4,7,120
3520 DATA 5,0,120
3530 REM MEASURE 10
3540 DATA 3,2,120
3550 DATA 3,9,120
3560 DATA 4,2,120
3570 DATA 4,6,120
3580 DATA 5,0,120
3590 DATA 4,2,120
3600 DATA 4,6,120
3610 DATA 5,0,120
3620 DATA 3,2,120
3630 DATA 3,9,120
3640 DATA 4,2,120
3650 DATA 4,6,120
3660 DATA 5,0,120
3670 DATA 4,2,120
```

```
3680 DATA 4,6,120
3690 DATA 5,0,120
3700 REM MEASURE 11
3710 DATA 3,7,120
3720 DATA 3,11,120
3730 DATA 4,2,120
3740 DATA 4,7,120
3750 DATA 4,11,120
3760 DATA 4,2,120
3770 DATA 4,7,120
3780 DATA 4,11,120
3790 DATA 3,7,120
3800 DATA 3,11,120
3810 DATA 4,2,120
3820 DATA 4,7,120
3830 DATA 4,11,120
3840 DATA 4,2,120
3850 DATA 4,7,120
3860 DATA 4,11,120
3870 REM MEASURE 12
3880 DATA 3,7,120
3890 DATA 3,10,120
3900 DATA 4,4,120
3910 DATA 4,7,120
3920 DATA 5,1,120
3930 DATA 4,4,120
3940 DATA 4,7,120
3950 DATA 5,1,120
3960 DATA 3,7,120
3970 DATA 3,10,120
3980 DATA 4,4,120
3990 DATA 4,7,120
4000 DATA 5,1,120
4010 DATA 4,4,120
4020 DATA 4,7,120
4030 DATA 5,1,120
4040 REM MEASURE 13
4050 DATA 3,5,120
4060 DATA 3,9,120
4070 DATA 4,2,120
4080 DATA 4,9,120
4090 DATA 5,2,120
4100 DATA 4,2,120
4110 DATA 4,9,120
4120 DATA 5,2,120
4130 DATA 3,5,120
4140 DATA 3,9,120
4150 DATA 4,2,120
4160 DATA 4,9,120
4170 DATA 5,2,120
4180 DATA 4,2,120
4190 DATA 4,9,120
4200 DATA 5,2,120
4210 REM MEASURE 14
4220 DATA 3,5,120
```

```
4230 DATA 3,8,120
4240 DATA 4,2,120
4250 DATA 4,5,120
4260 DATA 4,11,120
4270 DATA 4,2,120
4280 DATA 4,5,120
4290 DATA 4,11,120
4300 DATA 3,5,120
4310 DATA 3,8,120
4320 DATA 4,2,120
4330 DATA 4,5,120
4340 DATA 4,11,120
4350 DATA 4,2,120
4360 DATA 4,5,120
4370 DATA 4,11,120
4380 REM MEASURE 15
4390 DATA 3,4,120
4400 DATA 3,7,120
4410 DATA 4,0,120
4420 DATA 4,7,120
4430 DATA 5,0,120
4440 DATA 4,0,120
4450 DATA 4,7,120
4460 DATA 5,0,120
4470 DATA 3,4,120
4480 DATA 3,7,120
4490 DATA 4,0,120
4500 DATA 4,7,120
4510 DATA 5,0,120
4520 DATA 4,0,120
4530 DATA 4,7,120
4540 DATA 5,0,120
4550 REM MEASURE 16
4560 DATA 3,4,120
4570 DATA 3,5,120
4580 DATA 3,9,120
4590 DATA 4,0,120
4600 DATA 4,5,120
4610 DATA 3,9,120
4620 DATA 4,0,120
4630 DATA 4,5,120
4640 DATA 3,4,120
4650 DATA 3,5,120
4660 DATA 3,9,120
4670 DATA 4,0,120
4680 DATA 4,5,120
4690 DATA 3,9,120
4700 DATA 4,0,120
4710 DATA 4,5,120
4720 REM MEASURE 17
4730 DATA 3,2,120
4740 DATA 3,5,120
4750 DATA 3,9,120
4760 DATA 4,0,120
4770 DATA 4,5,120
```

```
4780 DATA 3,9,120
4790 DATA 4,0,120
4800 DATA 4,5,120
4810 DATA 3,2,120
4820 DATA 3,5,120
4830 DATA 3,9,120
4840 DATA 4,0,120
4850 DATA 4,5,120
4860 DATA 3,9,120
4870 DATA 4,0,120
4880 DATA 4,5,120
4890 REM MEASURE 18
4900 DATA 2,7,120
4910 DATA 3,2,120
4920 DATA 3,7,120
4930 DATA 3,11,120
4940 DATA 4,5,120
4950 DATA 3,7,120
4960 DATA 3,11,120
4970 DATA 4,5,120
4980 DATA 2,7,120
4990 DATA 3,2,120
5000 DATA 3,7,120
5010 DATA 3,11,120
5020 DATA 4,5,120
5030 DATA 3,7,120
5040 DATA 3,11,120
5050 DATA 4,5,120
5060 REM MEASURE 19
5070 DATA 3,0,120
5080 DATA 3,4,120
5090 DATA 3,7,120
5100 DATA 4,0,120
5110 DATA 4,4,120
5120 DATA 3,7,120
5130 DATA 4,0,120
5140 DATA 4,4,120
5150 DATA 3,0,120
5160 DATA 3,4,120
5170 DATA 3,7,120
5180 DATA 4,0,120
5190 DATA 4,4,120
5200 DATA 3,7,120
5210 DATA 4,0,120
5220 DATA 4,4,120
5230 REM MEASURE 20
5240 DATA 3,0,120
5250 DATA 3,7,120
5260 DATA 3,10,120
5270 DATA 4,0,120
5280 DATA 4,4,120
5290 DATA 3,10,120
5300 DATA 4,0,120
5310 DATA 4,4,120
5320 DATA 3,0,120
5330 DATA 3,7,120
5340 DATA 3,10,120
5350 DATA 4,0,120
5360 DATA 4,4,120
5370 DATA 3,10,120
5380 DATA 4,0,120
5390 DATA 4,4,120
5400 REM MEASURE 21
5410 DATA 2,5,120
5420 DATA 3,5,120
5430 DATA 3,9,120
5440 DATA 4,0,120
5450 DATA 4,4,120
5460 DATA 3,9,120
5470 DATA 4,0,120
5480 DATA 4,4,120
5490 DATA 2,5,120
5500 DATA 3,5,120
5510 DATA 3,9,120
5520 DATA 4,0,120
5530 DATA 4,4,120
5540 DATA 3,9,120
5550 DATA 4,0,120
5560 DATA 4,4,120
5570 REM MEASURE 22
5580 DATA 2,6,120
5590 DATA 3,0,120
5600 DATA 3,9,120
5610 DATA 4,0,120
5620 DATA 4,4,120
5630 DATA 3,9,120
5640 DATA 4,0,120
5650 DATA 4,4,120
5660 DATA 2,6,120
5670 DATA 3,0,120
5680 DATA 3,9,120
5690 DATA 4,0,120
5700 DATA 4,4,120
5710 DATA 3,9,120
5720 DATA 4,0,120
5730 DATA 4,4,120
5740 REM MEASURE 23
5750 DATA 2,8,120
5760 DATA 3,5,120
5770 DATA 3,11,120
5780 DATA 4,0,120
5790 DATA 4,2,120
5800 DATA 3,11,120
5810 DATA 4,0,120
5820 DATA 4,2,120
5830 DATA 2,8,120
5840 DATA 3,5,120
5850 DATA 3,11,120
5860 DATA 4,0,120
5870 DATA 4,2,120
5880 DATA 3,11,120
5890 DATA 4,0,120
5900 DATA 4,2,120
5910 REM MEASURE 24
5920 DATA 2,7,120
5930 DATA 3,5,120
5940 DATA 3,7,120
5950 DATA 3,11,120
5960 DATA 4,2,120
5970 DATA 3,7,120
5980 DATA 3,11,120
5990 DATA 4,2,120
6000 DATA 2,7,120
6010 DATA 3,5,120
6020 DATA 3,7,120
6030 DATA 3,11,120
6040 DATA 4,2,120
6050 DATA 3,7,120
6060 DATA 3,11,120
6070 DATA 4,2,120
6080 REM MEASURE 25
6090 DATA 2,7,120
6100 DATA 3,4,120
6110 DATA 3,7,120
6120 DATA 4,0,120
6130 DATA 4,4,120
6140 DATA 3,7,120
6150 DATA 4,0,120
6160 DATA 4,4,120
6170 DATA 2,7,120
6180 DATA 3,4,120
6190 DATA 3,7,120
6200 DATA 4,0,120
6210 DATA 4,4,120
6220 DATA 3,7,120
6230 DATA 4,0,120
6240 DATA 4,4,120
6250 REM MEASURE 26
6260 DATA 2,7,120
6270 DATA 3,2,120
6280 DATA 3,7,120
6290 DATA 4,0,120
6300 DATA 4,5,120
6310 DATA 3,7,120
6320 DATA 4,0,120
6330 DATA 4,5,120
6340 DATA 2,7,120
6350 DATA 3,2,120
6360 DATA 3,7,120
6370 DATA 4,0,120
6380 DATA 4,5,120
6390 DATA 3,7,120
6400 DATA 4,0,120
6410 DATA 4,5,120
6420 REM MEASURE 27
```

```
6430 DATA 2,7,120
6440 DATA 3,2,120
6450 DATA 3,7,120
6460 DATA 3,11,120
6470 DATA 4,5,120
6480 DATA 3,7,120
6490 DATA 3,11,120
6500 DATA 4,5,120
6510 DATA 2,7,120
6520 DATA 3,2,120
6530 DATA 3,7,120
6540 DATA 3,11,120
6550 DATA 4,5,120
6560 DATA 3,7,120
6570 DATA 3,11,120
6580 DATA 4,5,120
6590 REM MEASURE 28
6600 DATA 2,7,120
6610 DATA 3,3,120
6620 DATA 3,9,120
6630 DATA 4,0,120
6640 DATA 4,6,120
6650 DATA 3,9,120
6660 DATA 4,0,120
6670 DATA 4,6,120
6680 DATA 2,7,120
6690 DATA 3,3,120
6700 DATA 3,9,120
6710 DATA 4,0,120
6720 DATA 4,6,120
6730 DATA 3,9,120
6740 DATA 4,0,120
6750 DATA 4,6,120
6760 REM MEASURE 29
6770 DATA 2,7,120
6780 DATA 3,5,120
6790 DATA 3,7,120
6800 DATA 4,0,120
6810 DATA 4,7,120
6820 DATA 3,7,120
6830 DATA 4,0,120
6840 DATA 4,7,120
6850 DATA 2,7,120
6860 DATA 3,5,120
6870 DATA 3,7,120
6880 DATA 4,0,120
6890 DATA 4,7,120
6900 DATA 3,7,120
6910 DATA 4,0,120
6920 DATA 4,7,120
6930 REM MEASURE 30
6940 DATA 2,7,120
6950 DATA 3,2,120
6960 DATA 3,7,120
6970 DATA 4,0,120
6980 DATA 4,5,120
6990 DATA 3,7,120
7000 DATA 4,0,120
7010 DATA 4,5,120
7020 DATA 2,7,120
7030 DATA 3,2,120
7040 DATA 3,7,120
7050 DATA 4,0,120
7060 DATA 4,5,120
7070 DATA 3,7,120
7080 DATA 4,0,120
7090 DATA 4,5,120
7100 REM MEASURE 31
7110 DATA 2,7,120
7120 DATA 3,2,120
7130 DATA 3,7,120
7140 DATA 3,11,120
7150 DATA 4,5,120
7160 DATA 3,7,120
7170 DATA 3,11,120
7180 DATA 4,5,120
7190 DATA 2,7,120
7200 DATA 3,2,120
7210 DATA 3,7,120
7220 DATA 3,11,120
7230 DATA 4,5,120
7240 DATA 3,7,120
7250 DATA 3,11,120
7260 DATA 4,5,120
7270 REM MEASURE 32
7280 DATA 2,0,120
7290 DATA 3,0,120
7300 DATA 3,7,120
7310 DATA 3,10,120
7320 DATA 4,4,120
7330 DATA 3,7,120
7340 DATA 3,10,120
7350 DATA 4,4,120
7360 DATA 2,0,120
7370 DATA 3,0,120
7380 DATA 3,7,120
7390 DATA 3,10,120
7400 DATA 4,4,120
7410 DATA 3,7,120
7420 DATA 3,10,120
7430 DATA 4,4,120
7440 REM MEASURE 33
7450 DATA 2,0,120
7460 DATA 3,0,120
7470 DATA 3,5,120
7480 DATA 3,9,120
7490 DATA 4,0,120
7500 DATA 4,5,120
7510 DATA 4,0,120
7520 DATA 3,9,120
7530 DATA 4,0,120
7540 DATA 3,9,120
7550 DATA 3,5,120
7560 DATA 3,9,120
7570 DATA 3,5,120
7580 DATA 3,2,120
7590 DATA 3,5,120
7600 DATA 3,2,120
7610 REM MEASURE 34
7620 DATA 2,0,120
7630 DATA 2,11,120
7640 DATA 4,7,120
7650 DATA 4,11,120
7660 DATA 5,2,120
7670 DATA 5,5,120
7680 DATA 5,2,120
7690 DATA 4,11,120
7700 DATA 5,2,120
7710 DATA 4,11,120
7720 DATA 4,7,120
7730 DATA 4,11,120
7740 DATA 4,2,120
7750 DATA 4,5,120
7760 DATA 4,4,120
7770 DATA 4,2,120
7780 REM MEASURE 35
7790 DATA 4,4,0
7800 DATA 4,7,0
7810 DATA 5,0,0
7820 DATA 0,0,-9999
```

SID Program from Fall Issue (Part 4)

Use this program listing as a reference for Paul's changes here in Part 5.

```
100 FR=3520 :REM NOTE 'A' IN TOP OCTAVE
110 CO=2^(1/12)
120 FOR I=1 TO 9:FR=FR/CO:NEXT
130 SS=16777216
140 CS=1022730
150 FC=SS/CS
200 DIM F(7,11)
300 FOR I=0 TO 11
310 S=FR*FC
400 FOR J=7 TO 0 STEP-1:F(J,I)=S:S=S/2
410 NEXT
420 FR=FR*CO
430 NEXT
500 SID=54272
510 VOICE=0:OCT=3:WAVE=32
520 VM=7:HI=256
530 FOR I=0 TO 23:POKE SID+I,0:NEXT
540 POKE SID+24,15+16
550 READ A,D,S,R,PW,C,RE
560 FOR I=0 TO 2:INDEX=SID+I*VM
570 POKE INDEX+5,A*16+D
580 POKE INDEX+6,S*16+R
585 POKE INDEX+2,PW AND 255
590 NEXT
600 DATA 0,10,0,0,800,2000,15
610 POKE SID+23,7+RE*16
620 CH=INT(C/8):CL=C-CH*8
630 POKE SID+21,CL:POKE SID+22,CH
686 POKE INDEX+3,PW/HI
700 K$="Q2W3ER5T6Y7UI9O0P@-*[POUND]^"
710 DIM K(255)
720 FOR I=1 TO LEN(K$)
730 K(ASC(MID$(K$,I,1)))=I
740 NEXT
750 PRINT:PRINT"[SPACE]2[SPACE]3[SPACE2]5[SPACE]6[SPACE]7
    [SPACE2]9[SPACE]0[SPACE2]-[SPACE,POUND]"
760 PRINT"Q[SPACE]W[SPACE]E[SPACE]R[SPACE]T[SPACE]Y[SPACE]
    U[SPACE]I[SPACE]O[SPACE]P[SPACE]@[SPACE]*[SPACE]^"
800 GET A$:IF A$=""GOTO 800
810 KEY=K(ASC(A$))-1:IF KEY<0 GOTO 800
820 IF KEY>11 THEN FRQ=F(OCT+1,KEY-12):GOTO 835
830 FRQ=F(OCT,KEY)
835 FH=INT(FRQ/HI):FL=FRQ-FH*HI
840 INDEX=SID+VOICE*VM
850 POKE INDEX,FL:POKE INDEX+1,FH
860 POKE INDEX+4,WAVE:POKE INDEX+4,WAVE+1
870 VOICE=VOICE+1:IF VOICE>2 THEN VOICE=0
880 GOTO 800
```

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Everyone Needs A

Disk Drive Doctor

Sale $19.95

FACTS

- It has been estimated that 60% of all drive downtime is directly related to poorly maintained drives.
- Drives should be cleaned each week regardless of use.
- Drives are sensitive to smoke, dust and all micro particles.
- Systematic operator performed maintenance is the best way of ensuring error free use of your computer system.

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Cleanings Per Kit	**40 +**	25	30	2 original - 10 refill
Price	**$19.95**	$34.95	$24.95	$12.95
Abrasivity	**None**	Minimum	High	Moderate
Programming Required	**No**	No	Yes	No

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A Contest for Commodore 64 Kids, Too!

In the Fall issue of *Power/Play* we ran a computer drawing contest for kids who have VIC 20's, using Commodore's *Alpha Draw* program (available in the Sampler Six Pack). We're still in the process of judging that one, but, meanwhile, we thought kids who have Commodore 64's should have a contest, too. I was straining my brain to decide just what kind of contest to have when I received this great letter from Tim Vocelka in Monrovia, California. Read the letter and see if you can guess what the contest is going to be. I will tell you all about it after the letter so you can see if you were right and find out how to enter!

Tim Vocelka

Moveable Martin

Dear Betsy,

Our family owns a Commodore 64, which mainly my dad and I use. I'm glad you wrote your article because there are some questions that we'd like answers to. I'm planning on making a game of my own. Right now I'm working on getting sprites down for graphics. Next I'll get working on sound. I'm hoping my game will be a lot like an arcade game and sooner or later I'll be finished and send it in. Oh, and I'm eleven years old.

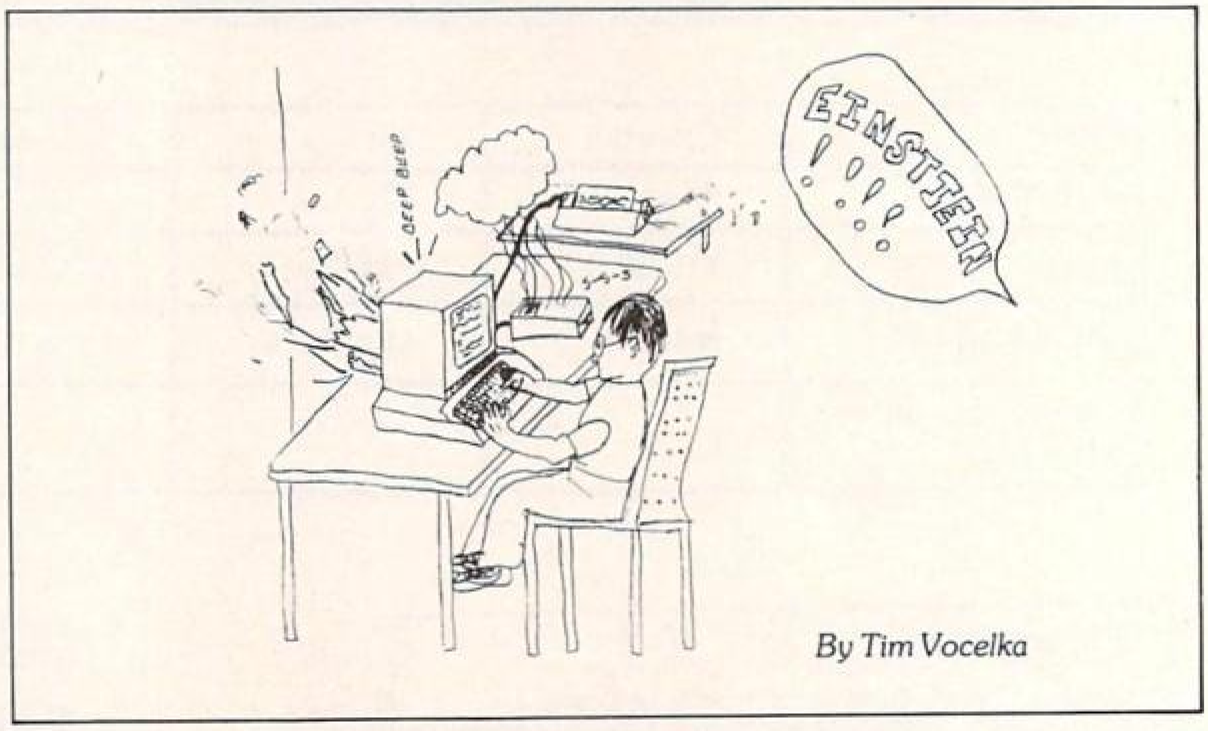
My dad and I have entered all the large programs at the back of the user guide and the one I think is the best is the piano keyboard. Neither of us could figure out the program JOTTO, which we guess may be impossible to find the solution to! (Note: there were some typos in the user guide. Most corrections appear in the *Programmers Reference Guide*; or check with your local users group. Betsy)

We think there ought to be more programs for the 64 in *Power/Play*, and I also wanted to ask if you need a disk or tape to do the LOGO in the last edition of the magazine. (To do the LOGO programs you must have the LOGO software package, available for less than $50.00 at your Commodore dealer. We have lots of fun with LOGO at our house! Betsy)

Since it wouldn't be great just to know that I'm *going* to write a program, I decided to make a simple one first. I am sending you a tape with only one program on it, for the Commodore 64. I called the program "Moveable Martin". All it is, is a multi-color sprite that you can move by pressing the letters, H,J,N, and U. At the beginning of the program there are a few instructions that are easy to follow. When you press 'Q' it will stop the program. Also when you go out one side of the screen and you keep pressing the same key you will come in the other side. If you want to expand Martin's size, break the program and type:

```
25 POKE V+23,1:POKE
v+29,1:D=100:H=200
```

Now Martin will be a lot bigger than he was! There's one last thing I have to say about the program;



By Tim Vocelka

after the instructions have gone by it will ask for the SIZE OF STEP. The larger the number you type in, the bigger step Martin will take. For example, if I type 20, Martin will move one full amount of his size in whatever direction I tell him to.

We'd greatly appreciate the answers to our questions. I'm glad to send my program in and hope it will be of some use.

Thanks a lot,
Tim Vocelka
Monrovia, California

Movable Martin

```
0 PRINT"[CLEAR,DOWN8]"
1 REM MOVABLE MARIO
2 PRINT"WHEN[SPACE]SIZE[SPACE]OF[SPACE]STEP[SPACE]SHOWS
  [SPACE]ON[SPACE]SCREEN":PRINT
3 PRINT"TYPE[SPACE]A[SPACE]NUMBER[SPACE]FROM[SPACE]1
  [SPACE]TO[SPACE]INFINITY.":PRINT:PRINT:PRINT
4 PRINT"WHEN[SPACE]MAN[SPACE]SHOWS[SPACE]ON[SPACE]SCREEN"
  :PRINT"PRESS[SPACE]U[SPACE]TO[SPACE]MOVE[SPACE]UP"
  :PRINT"H[SPACE]T0[SPACE]MOVE[SPACE]LEFT";
5 PRINT":J[SPACE]TO[SPACE]MOVE[SPACE]RIGHT":PRINT
  :PRINT"AND[SPACE]N[SPACE]TO[SPACE]MOVE[SPACE]DOMN"
6 FOR X=0 TO 20000:NEXT:PRINT"[CLEAR]"
7 POKE 53281,0:POKE 53280,1
8 PRINT"SIZE[SPACE]OF[SPACE]STEP";:INPUT Z
10 V=53248:POKE V+21,1:POKE V+39,2:POKE V+28,1:POKE V+37,6
   :POKE V+38,1
20 POKE 2040,13
25 D=100:H=150
27 FOR N=0 TO 62:READ Q:POKE 832+N,Q:NEXT
30 IF D<0 THEN D=255
31 IF D>255 THEN D=0
32 IF H<0 THEN H=255
33 IF H>255 THEN H=0
35 POKE V+0,H:POKE V+1,D
39 POKE V+0,H:POKE V+1, D
50 GET A$:IF A$=""THEN 50
55 IF A$="H"THEN H=H-Z
60 IF A$="J"THEN H=H+Z
70 IF A$="U"THEN D=D-Z
80 IF A$="N"THEN D=D+Z
90 IF A$="Q"THEN PRINT"[CLEAR]":POKE V+21,0:STOP
95 GOTO 30
100 DATA 0,170,128,2,170,128,85,85,64,0,255,192,15,207,0,
    15,255,0
200 DATA 0,255,0,0,252,0,2,150,0,2,150,0,2,90,0,2,90,0,2,
    250,0,2,250,0,1,85,0
300 DATA 2,170,0,2,138,0,2,138,0,2,138,0,15,255,0,15,255,0
```

kids' corner

If you haven't guessed by now, it's going to be a sprite-making contest, of course! What other kind of contest could we possibly have for Commodore 64 kids? Tim's program is ideally suited for plugging in your own sprite data. To make your sprites, you can use either Commodore's Sprite Maker (can be purchased in the *Screen Editor* software package from a Commodore dealer), a sprite maker you type in yourself (there's one in the *Programmer's Reference Guide,* and Tim Villanueva's version was published in the Summer, 1983, *Power/Play*) or one you make on your own. Type in Tim Vocelka's Movable Martin program and substitute *your* sprite data for the data that makes Martin. If you want to modify Tim's program a little, that's OK; just don't make it too long. One of the reasons we don't have more 64 programs in the magazines is that most are VERY long and we just don't have the space. After you are done with your program, make sure it *works* and if you have made any changes be sure to include the directions! Then save it to disk or tape and send it to me using the directions for sending stuff that you will find elsewhere in this issue. Don't forget to tell me something about yourself and include a picture of you. **C**

Contest Rules

1. There will be a prize awarded for the best sprite in three age groups:
Group A: Age 7 and under.
Group B: Age 8 to 11.
Group C: Age 12 to 18.

2. You may enter as many sprites as you like but all sprite data *must* be attached to the "Martin" program or one like it.

3. The winner in each age group will receive a free subscription to *Power/Play* and the Commodore Software package of their choice. All entries become the property of *Power/Play* and cannot be returned.

4. Winners will be announced in the Summer, 1984, issue of *Power/Play*, along with a picture of and data for the winning sprite. GOOD LUCK!!

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Learn to Read Music

by Alan M. Larson

"Dear Miss Byrne,
I'm 6 years old. I know my notes
from this program.   Erik Jensen"

A program (by a grown-up) to help kids learn the names of the notes, lines and spaces on the music staff. This version will run on either the VIC 20 or Commodore 64.

My grandson, Erik Jensen, was six years old on August 30 and entered the first grade Challenge Class at Little Egg Harbor Elementary School in Tuckerton, New Jersey, in September. I have introduced him to the VIC 20; he can LOAD and RUN cassettes and he knows the keyboard fairly well.

I thought Erik should learn a little about reading music, so I concocted the program below as a means of having him learn the music staff and the names of notes. He liked the program and learned the rule of naming notes. More importantly he learned the concept of mnemonics and the idea that music is, in a sense, a language.

The program is designed for young children with adult supervision. **C**

```
1 REM LEARNING NAMES  OF MUSIC STAFF LINES& SPACES&NOTES
2 REM A.M.LARSON VIC20
10 PRINT"[CLEAR]"
20 PRINT"[DOWN,RIGHT2]5[SHFT C7]F[SPACE]INE"
30 PRINT"[RIGHT2]4[SHFT C7]D[SPACE]OES"
40 PRINT"[RIGHT2]3[SHFT C7]B[SPACE]OY"
50 PRINT"[RIGHT2]2[SHFT C7]G[SPACE]OOD"
60 PRINT"[RIGHT2]1[SHFT C7]E[SPACE]VERY"
65 PRINT
70 PRINT"THE[SPACE]STAFF[SPACE]HAS[SPACE]5[SPACE]
   LINES.EACH[SPACE]LINE[SPACE]HAS[SPACE]A[SPACE]LETTER
   [SPACE]NAME[SPACE]AS[SPACE5]SHOWN.
80 PRINT"A[SPACE]MEMORY[SPACE]AID[SPACE2]IS[SPACE7]'EVERY
   [SPACE]GOOD[SPACE]BOY[SPACE]DOES[SPACE]FINE'"
85 PRINT
90 PRINT"PRESS[SPACE]ANY[SPACE]KEY"
100 GET B$:IF B$=""THEN 100
110 PRINT"[CLEAR]"
120 PRINT"[DOWN,RIGHT3,SHFT C7]"
130 PRINT"[SPACE2]4[SPACE8]E"
140 PRINT"[RIGHT3,SHFT C7]"
```

```
150 PRINT"[SPACE2]3[SPACE8]C"
160 PRINT"[RIGHT3,SHFT C7]"
170 PRINT"[SPACE2]2[SPACE8]A"
180 PRINT"[RIGHT3,SHFT C7]"
190 PRINT"[SPACE2]1[SPACE8]F"
200 PRINT"[RIGHT3,SHFT C7]"
210 PRINT
220 PRINT"THE[SPACE]STAFF[SPACE]HAS[SPACE]4[SPACE]SPACES.
    [SPACE2]EACH[SPACE]SPACE[SPACE]HAS[SPACE]A[SPACE4]
    LETTER[SPACE]NAME[SPACE]AS[SPACE]SHOWN."
225 PRINT
230 PRINT"A[SPACE]MEMORY[SPACE]AID[SPACE]IS[SPACE]THE
    [SPACE4]WORD[SPACE]'FACE'"
240 PRINT"PRESS[SPACE]ANY[SPACE]KEY"
250 GET B$:IF B$=""THEN 250
260 PRINT"[CLEAR]"
270 PRINT"A[SPACE]NOTE[SPACE]LOOKS[SPACE]LIKE[SPACE]A
    [SPACE3]ZERO[SPACE]AND[SPACE]IS[SPACE]PLACED[SPACE]ON
    [SPACE3]A[SPACE]LINE[SPACE]OR[SPACE]SPACE"
271 PRINT
272 PRINT"A[SPACE]NOTE[SPACE]GETS[SPACE]ITS[SPACE]NAME
    [SPACE4]FROM[SPACE]THE[SPACE]LINE[SPACE]OR[SPACE6]
    SPACE[SPACE]IT[SPACE]IS[SPACE]ON"
275 PRINT
280 PRINT"THE[SPACE]NAMES[SPACE]OF[SPACE]THE[SPACE]NOTES
    [SPACE]ARE[SPACE]A,B,C,D,E,F,G"
290 PRINT"PRESS[SPACE]ANY[SPACE]KEY"
300 GET B$:IF B$=""THEN 300
310 PRINT"[CLEAR]"
320 PRINT"[RIGHT5,SHFT C8]"
330 PRINT
340 PRINT"[RIGHT5,SHFT C8]"
350 PRINT"[SPACE8]O[SPACE2]"
360 PRINT"[RIGHT5,SHFT C8]"
370 PRINT
380 PRINT"[RIGHT5,SHFT C8]"
390 PRINT
400 PRINT"[RIGHT5,SHFT C8]"
410 PRINT
420 PRINT"THIS[SPACE]NOTE[SPACE]IS[SPACE]C[SPACE]BECAUSE
    [SPACE]IT[SPACE]IS[SPACE]ON[SPACE]SPACE[SPACE]3
    [SPACE6]WHICH[SPACE]IS[SPACE]NAMED[SPACE]C"
430 PRINT
440 PRINT"HIT[SPACE]ANY[SPACE]KEY"
```

```
710 PRINT"[CLEAR]"
720 LET A$="A"
730 INPUT"NAME[SPACE]NOTE[SPACE]ON[SPACE]SPACE[SPACE]2";A$
740 IF A$="A"THEN 770
750 PRINT"NOT[SPACE]RIGHT"
760 GOTO 730
770 PRINT"CORRECT"
780 PRINT
790 PRINT"HIT[SPACE]ANY[SPACE]KEY"
800 GET B$:IF B$=""THEN 800
810 PRINT"[CLEAR]"
820 PRINT
830 PRINT"[RIGHT5,SHFT C8]"
840 PRINT
850 PRINT"[RIGHT5,SHFT C3]O[SHFT C4]"
450 GET B$:IF B$=""THEN 450
460 PRINT"[CLEAR]"
470 PRINT
480 PRINT"[RIGHT5,SHFT C8]"
490 PRINT"[SPACE7]O"
500 PRINT"[RIGHT5,SHFT C8]"
510 PRINT
520 PRINT"[RIGHT5,SHFT C8]"
530 PRINT
540 PRINT"[RIGHT5,SHFT C8]"
550 PRINT
560 PRINT"[RIGHT5,SHFT C4]O[SHFT C3]"
570 PRINT
580 PRINT"NOTICE[SPACE]BOTH[SPACE]NOTES[SPACE6]ARE[SPACE]E
590 PRINT
600 PRINT"HIT[SPACE]ANY[SPACE]KEY"
610 GET B$:IF B$=""THEN 610
620 PRINT"[CLEAR]"
630 LET A$="E"
635 PRINT"ANSWER[SPACE]&[SPACE]HIT[SPACE]RETURN[SPACE4]
    KEY"
637 PRINT
640 INPUT"NAME[SPACE]NOTE[SPACE]ON[SPACE]LINE[SPACE]1";A$
650 IF A$="E"THEN 680
660 PRINT"WRONG-TRY[SPACE]AGAIN"
670 GOTO 640
680 PRINT"RIGHT"
690 PRINT"HIT[SPACE]ANY[SPACE]KEY"
700 GET B$:IF B$=""THEN 700
```

```
860 PRINT
870 PRINT"[RIGHT5,SHFT C8]"
880 PRINT
890 PRINT"[RIGHT5,SHFT C8]"
900 PRINT
910 PRINT"[RIGHT5,SHFT C8]"
920 PRINT
930 LET A$="D"
940 INPUT"NAME[SPACE]NOTE[SPACE]ON[SPACE]STAFF";A$
950 IF A$="D"THEN 980
960 PRINT"WRONG"
970 GOTO 940
980 PRINT"RIGHT[SPACE]ON"
990 PRINT
1000 PRINT"HIT[SPACE]ANY[SPACE]KEY"
1010 GET B$:IF B$=""THEN 1010
1020 PRINT"[CLEAR]"
1030 PRINT"[RIGHT5,SHFT C8]"
1040 PRINT
1050 PRINT"[RIGHT5,SHFT C8]"
1060 PRINT
1070 PRINT"[RIGHT5,SHFT C8]"
1080 PRINT
1090 PRINT"[RIGHT5,SHFT C4]O[SHFT C]O[SHFT C]"
1100 PRINT
1110 PRINT"[RIGHT5,SHFT C2]O[SHFT C5]"
1120 PRINT
1130 INPUT"NAME[SPACE]WORD[SPACE]ON[SPACE]STAFF";A$
1140 IF A$="EGG"THEN 1170
1150 PRINT"WRONG"
1160 GOTO 1130
1170 PRINT"FANTASTIC"
1180 PRINT
1190 PRINT"HIT[SPACE]ANY[SPACE]KEY"
1200 GET B$:IF B$=""THEN 1200
1210 PRINT"[CLEAR]"
1220 PRINT"IT'S[SPACE]STORY[SPACE]TIME----"
1230 PRINT
1240 PRINT"ROBBIT[SPACE]WAS[SPACE]A"
1250 PRINT
1260 PRINT"[RIGHT4,SHFT C8]"
1270 PRINT
1280 PRINT"[RIGHT4,SHFT C6]O[SHFT C]"
1290 PRINT
```

```
1300 PRINT"[RIGHT4,SHFT C]O[SHFT C6]"
1310 PRINT"[SPACE8]O[SPACE3]"
1320 PRINT"[RIGHT4,SHFT C8]"
1330 PRINT
1340 PRINT"[RIGHT4,SHFT C8]"
1350 PRINT
1360 PRINT"PIRATE.[SPACE]HE[SPACE]STOLE[SPACE]MONEY[SPACE]
     FROM[SPACE]A[SPACE]RICH[SPACE]KING"
1370 PRINT"HIT[SPACE]ANY[SPACE]KEY"
1380 GET B$:IF B$=""THEN 1380
1390 PRINT"[CLEAR]"
1400 PRINT"ROBBIT[SPACE]HID[SPACE]THE[SPACE]MONEY[SPACE3]
     SO[SPACE]NO[SPACE]ONE[SPACE]COULD[SPACE]ROB[SPACE4]
     HIM."
1410 PRINT"ONE[SPACE]DAY[SPACE]A[SPACE]POLICEMAN[SPACE3]
     PUT[SPACE]ROBBIT[SPACE]IN[SPACE]JAIL."
1420 PRINT"ROBBIT[SPACE]LEFT[SPACE]HIS[SPACE]MOTHER[SPACE]
     &[SPACE]HIS[SPACE]PARROT[SPACE]AT[SPACE]HOME"
1430 PRINT"ONE[SPACE]DAY[SPACE]THE[SPACE]PARROT[SPACE5]
     FLEW[SPACE]INTO[SPACE]THE[SPACE]JAIL"
1440 PRINT"'YOUR[SPACE]MOTHER[SPACE]IS[SPACE]HUNGRY
      [SPACE4]SHE[SPACE]HAS[SPACE]NO[SPACE]MONEY[SPACE3]
     FOR[SPACE]FOOD'"
1450 PRINT"ROBBIT[SPACE]WROTE[SPACE]A[SPACE]SECRET[SPACE]
     CODED[SPACE]MESSAGE[SPACE]ON[SPACE]THE[SPACE3]
     PARROT'S[SPACE3]BEAK"
1460 PRINT"HE[SPACE]SAID,'THIS[SPACE]WILL[SPACE4]TELL
      [SPACE]MOTHER[SPACE]WHERE[SPACE]THE[SPACE]MONEY
      [SPACE]IS'"
1470 PRINT"THE[SPACE]PARROT[SPACE]FLEW[SPACE]HOME"
1480 PRINT"HIT[SPACE]ANY[SPACE]KEY"
1490 GET B$:IF B$=""THEN 1490
1500 PRINT"[CLEAR]"
1510 PRINT
1520 PRINT
1550 PRINT"THE[SPACE]MESSAGE[SPACE]WAS--"
1560 PRINT
1570 PRINT"[RIGHT4,SHFT C8]"
1580 PRINT
1590 PRINT"[RIGHT4,SHFT C6]O[SHFT C]"
1600 PRINT
1610 PRINT"[RIGHT4,SHFT C]O[SHFT C6]"
1620 PRINT
1630 PRINT"[RIGHT4,SHFT C8]"
```

```
1640 PRINT
1650 PRINT"[RIGHT4,SHFT C4]O[SHFT C3]"
1660 PRINT
1670 INPUT"WHERE[SPACE]IS[SPACE]THE[SPACE]MONEY";A$
1680 IF A$="BED"THEN 1710
1690 PRINT"WRONG"
1700 GOTO 1670
1710 PRINT"IN[SPACE]BED--YOU[SPACE]ARE[SPACE]RIGHT"
1720 PRINT"THE[SPACE]END"
1730 STOP
```

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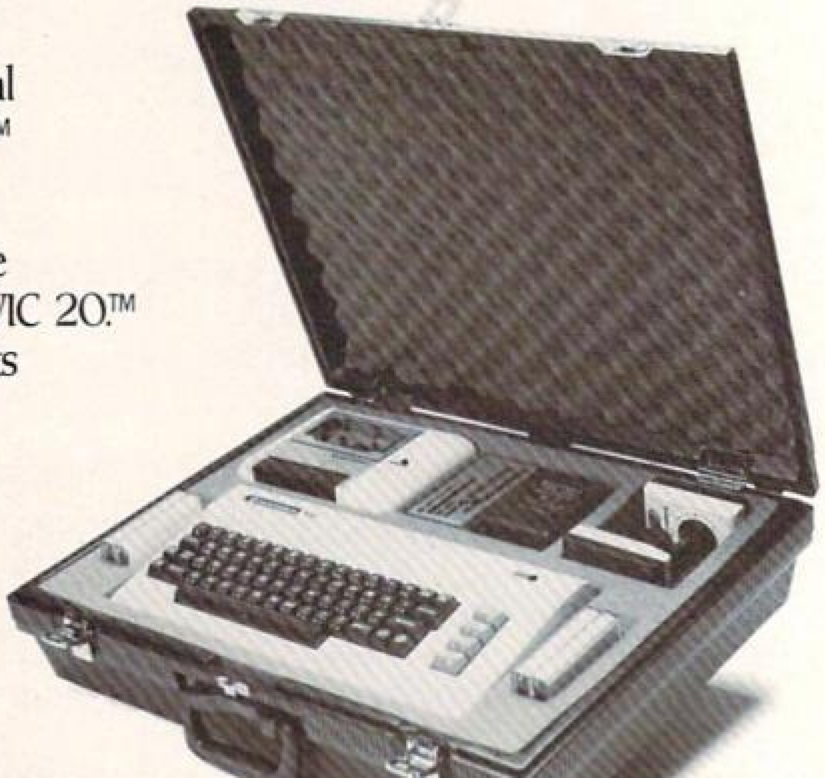

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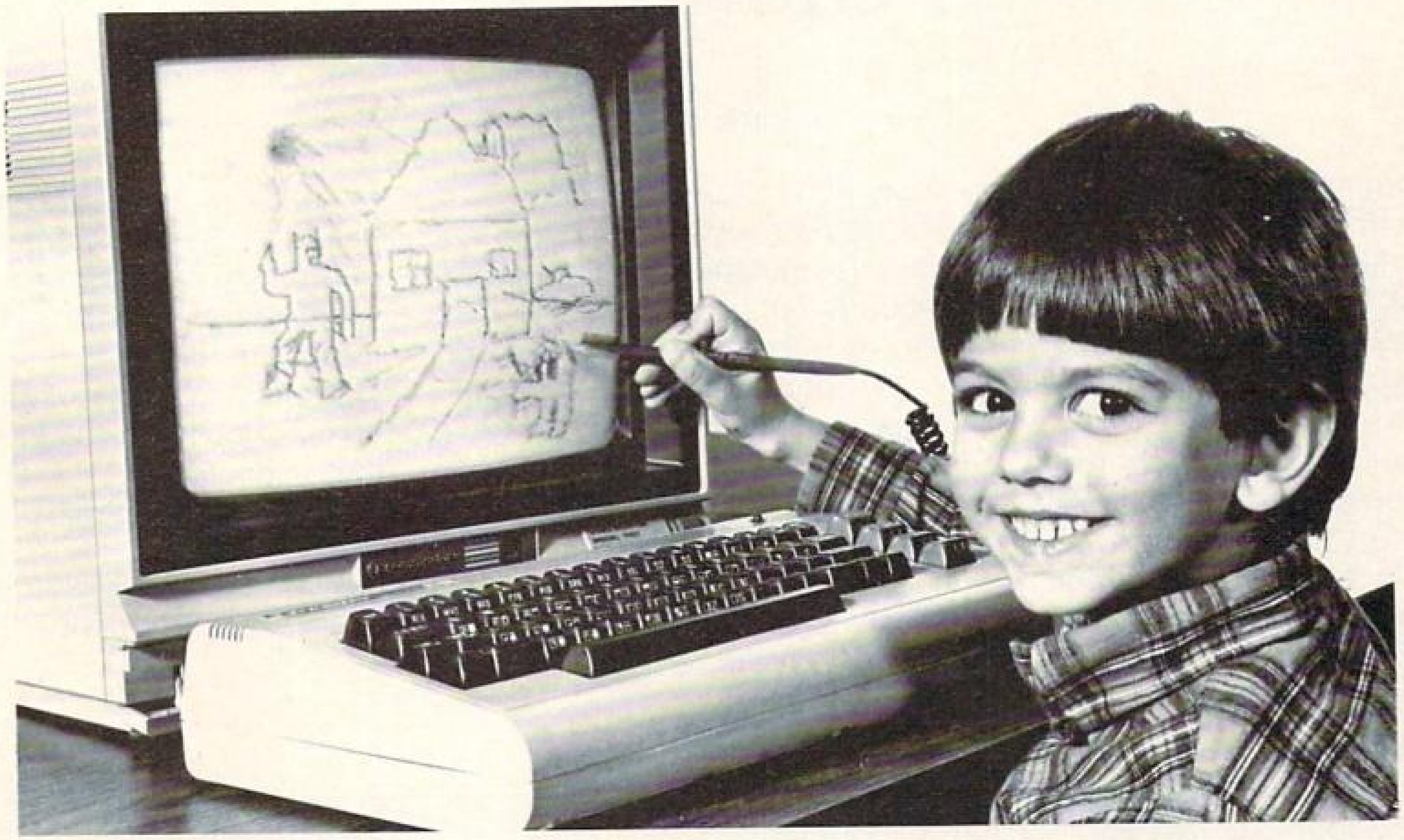

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Shootout

by Peter Deal

"Shootout" is for the 40-column PET, but it will work on the Commodore 64 if you change line 290. Change PEEK(151) to PEEK(197) and 255 to 64. Also, you may need to change keys 4, 6 and F to some other keys.

"Shootout" starts by showing a brief version of the instructions followed by the keys to use. You are on the bottom of the screen shooting at shifted V's, which are at the top. If you want to shoot some other character instead of V's, you can just change C$ to fit your needs. One game lasts thirty seconds, but you can change T so the game lasts as long as you want.

"Shootout" is the kind of game where nobody wins and nobody loses. Of course, if you are playing against someone else, whoever hits more blocks wins.

Here's how it started. Once, a man was playing "Breakout". He liked the idea of hitting blocks but he didn't like having to watch the ball so the game wouldn't end. He thought up an idea for a game where you shoot the blocks and have a time limit. I just heard of his idea and wrote "Shootout". (I hope by now you know this isn't the math Shootout.)

Well, happy typing!! **C**

Peter is the son of Elizabeth Deal, one of our regular contributors to Commodore *magazine.*

Shootout

```
20 T=30:GOSUB430
30 HS=0:DIMT(39)
40 FORI=0TO39:T(I)=12:NEXTI
50 PRINT"[CLEAR]":TI$="000000"
60 A$="[DOWN,SPACE,RVS,SHFT ),SPACE3,SHFT BACK ARROW,RVOFF,SPACE,UP]"
70 A$=A$+"[LEFT6,SPACE,SHFT ,]^[SHFT ;,SPACE]"
90 B$="[LEFT,SPACE,UP,LEFT,SHIFT ]]"
95 PRINT"[HOME,RVS,SPACE39,RVOFF]"
100 C$="[SHFT V39]"
110 FORI=1TO8:PRINTC$:NEXTI
120 D$="[HOME,DOWN 20]"
130 PRINTD$
140 R$="[RIGHT39]"
150 C=15:S=0:I$=""
160 IFC<0THENC=0
170 IFC>33THENC=33
180 PRINT"[UP]"LEFT$(R$,C)A$;
190 IFF=0GOTO250
200 PRINT"[LEFT2]";
210 FORI=1TOT(C):PRINTB$;:NEXT
220 F=0:PRINT"[LEFT,SPACE]"D$;
230 T(C)=T(C)+1:IFT(C)<21THENS=S+1
240 IFT(C)>20THENFORI=1TO20:POKE59468,26-PEEK(59468):NEXTI
250 PRINT
260 IFVAL(TI$)>TGOTO340
```

```
270 Z$=I$:GETI$
280 IFI$=""THENIFPEEK(151)<>255THENI$=Z$
290 IFI$<>"4"ANDI$<>"6"ANDI$<>"F"GOTO260
300 IFI$="4"THENC=C-1:GOTO160
310 IFI$="6"THENC=C+1:GOTO160
320 IFI$="F"THENF=1:GOTO160
330 REM-----------
340 PRINT"[CLEAR,SPACE8]****[SPACE2]SHOOTOUT[SPACE]****"
350 IF S>HS THEN HS=S
360 PRINT"[DOWN,SPACE]YOU[SPACE]SHOT"S"BLOCKS[SPACE]
    IN"T"SECONDS."
370 PRINT"[DOWN,SPACE]THE[SPACE]MOST[SPACE]SHOT[SPACE]
    WAS"HS".
380 PRINT"[DOWN2,SPACE]DO[SPACE]YOU[SPACE]WANT[SPACE]TO
    [SPACE]PLAY[SPACE]AGAIN?[SPACE](Y/N)"
390 GET I$:IF I$<>"Y"AND I$<>"N"GOTO 390
400 IF I$="Y"GOTO 40
410 PRINT"[DOWN,SPACE]THANKS[SPACE]FOR[SPACE]PLAYING,
    [SPACE]BYE!!!"
420 END
430 REM----------
440 PRINT"[CLEAR,SPACE9]****[SPACE2]SHOOTOUT[SPACE2]****"
450 PRINT"[DOWN,SPACE13]BY[SPACE]PETER[SPACE]DEAL"
460 PRINT"[DOWN,SPACE2]YOU[SPACE]ARE[SPACE]ON[SPACE]THE
    [SPACE]BOTTOM[SPACE]OF[SPACE]THE[SPACE]SCREEN."
470 PRINT"[DOWN,SPACE]THE[SPACE]OBJECT[SPACE]IS[SPACE]TO
    [SPACE]SHOOT[SPACE]AS[SPACE]MANY[SPACE]BLOCKS"
480 PRINT"[DOWN,SPACE]AS[SPACE]POSSIBLE[SPACE]
    IN"T"SECONDS.[SPACE]THE[SPACE]BLOCKS"
490 PRINT"[DOWN,SPACE]LOOK[SPACE]LIKE[SPACE]THIS-[SHFT V]
    ."
500 PRINT"[DOWN2,SPACE9]PRESS[SPACE,RVS]4[RVOFF,SPACE]TO
    [SPACE]GO[SPACE]LEFT."
510 PRINT"[DOWN,SPACE9]PRESS[SPACE,RVS]6[RVOFF,SPACE]TO
    [SPACE]GO[SPACE]RIGHT."
520 PRINT"[DOWN,SPACE9]PRESS[SPACE,RVS]F[RVOFF,SPACE]TO
    [SPACE]FIRE[SPACE]MISSILE."
530 PRINT"[DOWN2,RVS]GOOD[SPACE]LUCK!![RVOFF]"
540 PRINT"[DOWN,SPACE6]PRESS[SPACE]ANY[SPACE]KEY[SPACE]TO
    [SPACE]START."
550 GET I$:IF I$=""GOTO 550
560 RETURN
```

How to Submit Things to Kids' Corner

Programs: *Must* be sent on disk or tape, clearly marked with computer type and your name, address, and PHONE NUMBER. If your program is for the VIC, mark the label with the amount of memory you had plugged in when you saved the program. Send a printout (listing) if you can, and BE SURE that your disk or tape is mailed in a PADDED protective envelope. Tapes should be in a mailing case, disks between two pieces of stiff cardboard. Protective envelopes are found at office supply stores for around 25 cents. They're worth it!

Articles, Stories, Poems, etc.: Should be typed or computer printed, double spaced, each page numbered, and headed with the title and author's name, address, and phone number. I can, if absolutely necessary, accept text that is neatly hand printed on every other line, each page numbered and headed as described above.

Photographs: Color or black and white, preferably 35mm. Taped or otherwise attached to a stiff piece of paper or cardboard (but make sure they can be removed without damaging them). Label the paper with some type of caption, the name(s) of the person(s) pictured, and the name, address, and phone number of the sender. (School pictures are just fine.)

Drawings: Black and white might be best; at least outline things in a dark color if you can. Make them big enough that details will show if they have to be reduced. If you are sending a cartoon, print the captions in the balloons very carefully, or get someone who is really good at printing to do the words for you. Mail them using the same directions as for photographs.

If you are sending a program, don't forget to include the directions! It's a good idea to have them right in the program if you can. Be sure to keep a copy of everything you send. I might need to call you about it, and unfortunately, I can't send anything back. If you have already sent something in and didn't see it in this issue, remember that we have to get *Power/Play* ready for printing almost THREE months before you read it! If something you sent is going to be in the magazine, you will probably get a phone call from me before you see it in print so don't forget to include your AREA CODE and phone number.

Even if you are sending a drawing, photo or program, write something that tells a little bit about YOU. Don't forget to send a picture of yourself!

The address to send things to is:

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Despite the wild claims made by the Blackjack system charlatans, it is not possible to learn an effective strategy overnight. Learning an effective strategy takes time and discipline. If learning a strategy were easy, everyone would be making a living playing Blackjack. As it stands, less than one percent play well enough to make money.

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The SOTA Story

SOTA Enterprises has consistently produced nothing less than the highest quality software. When you buy software from SOTA, we do our utmost to make sure you get your money's worth.

ATTENTION VIC 20 USERS

A new version of BLACKJACK TEACHER is now available for the VIC 20. Although not as comprehensive as the original 32K program, the VIC 20 version does teach Basic Strategy – a must for the Blackjack strategy beginner!

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Gone Fishing

by Harry E. Watts

No need to get wet and cold to catch these computer fish on your unexpanded VIC 20.

Like fishing? Try your luck with this program on the VIC 20. It's possible to catch 20 species of computer fish weighing from one to 50+ pounds. Read the old fishing adage and begin your adventure from the comfort of your home.

Wind from the North...
Don't go forth.

Wind from the East...
Fishing is least.

Wind from the South...
Blows the bait in their mouth.

Wind from the West...
Fishing is best.

Enter a skill level. The VIC will give you the lake size and wind direction. Enter the fishing depth you prefer and the VIC gives you the corresponding water temperature. Select your fishing line weight and choice of bait.

Suspense. What will you catch? Perhaps you caught a 37-pound 9-ounce muskie! Could it be a 1-pound 2-ounce bluegill or did the fish break your line? Maybe you couldn't hook the fish. Just try again. These are all possibilities in "Gone Fishing."

Simple Explanation of the Program

Like true fishing, "Gone Fishing" incorporates both skill and luck. Random numbers are generated within a fixed range for lake size and wind direction. Lake size and wind direction with the input of depth determine water temperature, which in turn determines the species of fish. The species of fish and a random number with a high limit determine the weight of fish.

Skill is needed in deciding on the line weight and bait size. Change the parameters in lines 570 and 580 to make the program easier or more difficult. The fish species and high weight limits are defined by arrays. Change F$ in lines 20 to 60 to use species of fish in your area and W in lines 70 to 90 for the corresponding maximum weights. Numbers close to Minnesota state records were used for maximum weights in this program.

Improvements

How can "Gone Fishing" be improved? Can barometric pressure, lunar period or other variables be included in the program? There are 252 bytes left in an unexpanded VIC. Done fishing. **C**

Gone Fishing

```
5 REM GONE FISHING BY HARRY WATTS, 315 OAK BEND DRIVE
6 REM DULUTH,MN,55811,JULY, 1983
10 DIM F$(20),W(20),WD$(4)
20 F$(1)="LAKE[SPACE]TROUT":F$(2)="SPLAKE":F$(3)="CHINOOK"
   :F$(4)="COHO"
30 F$(5)="CATFISH":F$(6)="PINK[SPACE]SALMON"
   :F$(7)="BROOK[SPACE]TROUT":F$(8)="SUCKER"
40 F$(9)="RAINBOW":F$(10)="BRN[SPACE]TROUT"
   :F$(11)="DOGFISH":F$(12)="MUSKIE"
50 F$(13)="NORTHERN":F$(14)="BURBOT":F$(15)="WALLEYE"
   :F$(16)="SM[SPACE]BASS"
```

```
60 F$(17)="BLUEGILL":F$(18)="PERCH":F$(19)="CRAPPIE"
   :F$(20)="LM[SPACE]BASS"
70 W(1)=40:W(2)=(8):W(3)=(40):W(4)=9:W(5)=37:W(6)=2:W(7)=5
80 W(8)=8:W(9)=16:W(10)=15:W(11)=10:W(12)=54:W(13)=44
   :W(14)=13
90 W(15)=15:W(16)=7:W(17)=2:W(18)=2:W(19)=4:W(20)=9
100 WD$(1)="NORTH":WD$(2)="EAST":WD$(3)="SOUTH"
    :WD$(4)="WEST"
110 GOSUB 2000
120 PRINT"[DOWN3,RIGHT5]GONE[SPACE]FISHING"
130 GOSUB 1100
140 FOR I=1 TO 2000:NEXT
150 PRINT"[CLEAR]":
160 PRINT"THIS[SPACE]PROGRAM[SPACE]WILL"
170 PRINT"TEST[SPACE]YOUR"
174 PRINT"FISHING[SPACE]SKILLS."
180 PRINT:PRINT"WIND[SPACE]FROM[SPACE]NORTH.."
190 PRINT"DON'T[SPACE]GO[SPACE]FORTH."
200 PRINT:PRINT"WIND[SPACE]FROM[SPACE]THE[SPACE]EAST.."
210 PRINT"FISHING[SPACE]IS[SPACE]LEAST."
220 PRINT:PRINT"WIND[SPACE]FROM[SPACE]THE[SPACE]SOUTH.."
230 PRINT"BLOWS[SPACE]THE[SPACE]BAIT"
240 PRINT"IN[SPACE]THEIR[SPACE]MOUTH."
250 PRINT:PRINT"WIND[SPACE]FROM[SPACE]THE[SPACE]WEST.."
260 PRINT"FISHING[SPACE]IS[SPACE]BEST."
263 FOR I=1 TO 5000:NEXT:GOSUB 1000
264 PRINT"[CLEAR]":PRINT"ENTER[SPACE]YOUR[SPACE]ANSWER"
265 PRINT"AFTER[SPACE]THE[SPACE]?[SPACE]AND"
266 PRINT"PRESS[SPACE]RETURN."
270 PRINT: PRINT"AT[SPACE]WHAT[SPACE]SKILL[SPACE]LEVEL"
280 PRINT"WILL[SPACE]YOU[SPACE]PLAY?"
290 PRINT:PRINT"1-EASY[SPACE]5-DIFFICULT"
300 INPUT"1-5";S:IF S<1 OR S>5 THEN 300
310 LS=INT(RND(1)*5000)+300:WD=INT((RND(1)*4)+1)
320 PRINT:PRINT "THE[SPACE]SIZE[SPACE]OF[SPACE]YOUR"
330 PRINT"LAKE[SPACE]IS";LS;"ACRES."
340 PRINT:PRINT"THE[SPACE]WIND[SPACE]IS[SPACE]FROM"
350 PRINT"THE[SPACE]";WD$(WD);"[SPACE]TODAY."
360 PRINT:PRINT"AT[SPACE]WHAT[SPACE]DEPTH[SPACE]WILL"
370 PRINT"YOU[SPACE]FISH?"
380 INPUT"5-75";D
390 IF D<5 OR D>75 THEN 380
395 GOSUB 1000
```

```
400 T=INT(SQR((LS/WD)/D))+51:IF T>71 THEN T=71
410 PRINT"[CLEAR]":PRINT"THE[SPACE]LAKE[SPACE]TEMPERATURE"
420 PRINT"AT[SPACE]THIS[SPACE]DEPTH[SPACE]IS";T
430 PRINT:PRINT"WHAT[SPACE]WEIGHT[SPACE]FISHING"
440 PRINT"LINE[SPACE]WILL[SPACE]YOU[SPACE]USE?"
450 INPUT "2-25";W
460 IF W<2 OR W>25 THEN 450
470 PRINT:PRINT"WHAT[SPACE]KIND[SPACE]OF[SPACE]BAIT"
480 PRINT"WILL[SPACE]YOU[SPACE]USE?"
490 PRINT:PRINT"[RIGHT3](1)WORM"
500 PRINT"[RIGHT3](2)LEECH"
505 PRINT"[RIGHT3](3)MINNOW"
510 PRINT"[RIGHT3](4)SPOON"
515 PRINT"[RIGHT3](5)PLUG"
520 PRINT:INPUT"[RIGHT3]1-5";B
525 K=SQR((LS/WD)/D):IF K>20 THEN K=20
530 KW=INT(RND(1)*W(K))+1:Z=INT(RND(1)*15)+1
535 GOSUB 1000
540 PRINT"[CLEAR]":PRINT"YOU[SPACE]HAVE[SPACE]A[SPACE]
    BITE..."
550 FOR I=1 TO 1000:NEXT:PRINT
570 IF(W*2.3)-S<KW THEN PRINT"BUT[SPACE]THE[SPACE]FISH
    [SPACE]BROKE[SPACE5]YOUR[SPACE]LINE.":GOTO 610
580 IF KW<B THEN PRINT"BUT[SPACE]YOU[SPACE]COULD[SPACE]
    NOT[SPACE]HOOK[SPACE]THE[SPACE]FISH":GOTO 610
590 PRINT"[SPACE]AND[SPACE]CAUGHT[SPACE]A[SPACE]"
600 PRINT KW;"#";Z;"OZ[SPACE]";F$(K)
610 PRINT:PRINT"WOULD[SPACE]YOU[SPACE]LIKE[SPACE]TO[SPACE]
    TRY"
620 PRINT"AGAIN?[SPACE]TYPE[SPACE]Y[SPACE]OR[SPACE]N"
630 INPUT "AND[SPACE]PRESS[SPACE]RETURN";A$
640 IF A$="Y"THEN 264
650 IF A$="N"THEN GOSUB 2000
670 PRINT CHR$(142):PRINT"[DOWN3,RIGHT5]DONE[SPACE]
    FISHING"
675 GOSUB 1100
680 GET A$:IF A$=""THEN 680
690 END
1000 A$="[RVS]"
1010 FOR L=1 TO 1000
1020 PRINT"[HOME]"
```

```
1030 PRINT TAB(2)A$;"[DOWN20]HIT[SPACE]RETURN[SPACE]TO
     [SPACE]CONT."
1040 GET R$:IF R$=CHR$(13)THEN RETURN
1050 FOR I=1 TO 333:NEXT
1060 IF A$="[RVS]"THEN A$="[RVOFF]":GOTO 1080
1070 IF A$="[RVOFF]"THEN A$="[RVS]":GOTO 1080
1080 NEXT
1100 PRINT"[RIGHT4,CMDR D]"
1110 PRINT"[RIGHT4,SHFT -,SHFT M]"
1120 PRINT"[RIGHT4,SHFT -,SPACE,SHFT M]"
1130 PRINT"[RIGHT4,SHFT -,SPACE2,SHFT M,SPACE2,SHFT W]"
1140 PRINT"[RIGHT4,SHFT -,SPACE3,SHFT M,SHFT N,CMDR +,
     SHFT M]"
1150 PRINT"[RIGHT4,SHFT -,SPACE,CMDR @4,CMDR +,CMDR @5]"
1160 PRINT"[RIGHT4,SHFT -,SPACE,SHFT M,SPACE8,SHFT N]"
1170 PRINT"[RIGHT4,SHFT -,SPACE2,SHFT M,SPACE6,SHFT N]"
1180 PRINT"[RIGHT4,SHFT -,SPACE3,CMDR T6]"
1190 PRINT"[RIGHT4,SHFT -,SPACE3,CMDR @2]"
1200 PRINT"[RIGHT4,SHFT -,SPACE2,SHFT N,SPACE2,SHFT M,
     SHFT N,CMDR G]"
1210 PRINT"[RIGHT4,SHFT J,SHFT K]<.[SPACE2,CMDR M,SPACE,
     CMDR G]"
1220 PRINT"[RIGHT7,SHFT M,SHFT K,SPACE,SHFT N,SHFT M,
     CMDR G]"
1230 PRINT"[RIGHT8,CMDR T2]"
1240 RETURN
2000 PRINT"[CLEAR]"
2020 FOR J=0 TO 21:POKE 7680+J,160:POKE 38400+J,0:NEXT
2030 FOR J=0 TO 440 STEP 22:POKE 7723+J,160:POKE 38443+J,0
     :NEXT
2040 FOR J=21 TO 0 STEP-1:POKE 8164+J,160:POKE 38884+J,0
     :NEXT
2050 FOR J=440 TO 0 STEP-22:POKE 7702+J,160:POKE 38422+J,0
     :NEXT
2060 RETURN
```

More Cartoons for the VIC 20

by John Stilwell

Last issue we ran two of John's cartoons for the VIC 20, which were so much fun we decided to run two more in this issue. (Apologies for misspelling your name last time, John.)

For the last year and a half, I have worked on a local television show called the FRP show. Before you ask, FRP stands for Fantasy Role Playing. Each month we have a different game like "Dungeons and Dragons" and "Traveler". Less than a year ago I advanced from cameraman to the control room. There I did computer graphics for the show. The station's equipment could only handle text, so each month I used my VIC 20.

In the beginning I worked up a series of cartoons, one for each of the subjects that the show touched. Since the show is live and three hours long the guests tend to tire out. To help keep things moving I would occasionally superimpose a cartoon on the players. They would eventually notice it on the studio monitor, thus momentarily throwing a monkey wrench into the action. The viewers loved it.

Below are two more cartoons that I wrote for the show. The first one is for games that revolve around the idea of super heroes. It is also the longest cartoon that I wrote. "Super Fight" is the battle between a generic super hero and the Crabman! When we did games like "Campions", this program was sure to be used.

Another kind of game that we did was of the sword-and-sorcery style. In one adventure the fearless warriors were exploring a dank network of caverns. The odor of reptile was heavy in the air as they approached a half rotted door in the moldy rock wall. In the torch light they listened for telltale sounds from within the next room. The second cartoon is what they saw when they opened the door.

Both programs work on the unexpanded VIC 20. Line 20 sets the pointers so the program won't write over the character set. Lines 20 to 60 set up the new character set. The final pictures are made up of several characters. The last part of the program puts these characters together like the pieces of a puzzle. Then individual pieces are replaced, giving the illusion of motion. In the "Super Fight" program this is accomplished by lines 80 to 110 and lines 470 to the end. In the "Dragon Power" program this is from line 460 to the end.

The action starts immediately in "Dragon Power". In "Super Fight" you have to start it yourself. When the Crabman appears push any key to start the fight. I'm sure that you will like these cartoons. They really show off the graphics capability of the VIC.

If you do not want to type these programs in, send me $3 and I will be very happy to send you a tape. My address is 5018 Marathon Drive, Madison, Wisconsin 53705.

C

Super Fight

```
10 POKE 36879,27:X=27:POKE 52,X:POKE 56,X:POKE 51,PEEK(55)
   :CLR
20 CS=256*PEEK(52)+PEEK(51)
30 FOR I=CS TO CS+511:POKE I,PEEK(I+32768-CS):NEXT
40 READ X:IF X<0 THEN 60
50 FOR I=X TO X+7:READ J:POKE I,J:NEXT:GOTO 40
60 POKE 36869,255:GOTO 470
70 FOR I=1 TO 500:NEXT:RETURN
```

```
80 PRINT TAB(11)"[SPACE3,LEFT3,DOWN,SPACE]ST[DOWN,LEFT3]
   UVW[LEFT,DOWN,LEFT2,SPACE]X[SPACE,LEFT2,DOWN,SPACE2,UP,
   LEFT,UP3]"
90 FOR I=1 TO 100:NEXT:RETURN
100 PRINT"@A[LEFT2,DOWN,LEFT]BC[LEFT2,DOWN]DEF[LEFT3,DOWN]
    I[SPACE]#":RETURN
110 PRINT TAB(3)"@A[LEFT2,DOWN,LEFT]BC[LEFT2,DOWN]DEF
    [LEFT3,DOWN]GH#":RETURN
120 DATA 7168,0,60,66,66,34,16,17,18
130 DATA 7176,0,0,0,56,72,136,8,8
140 DATA 7184,0,0,1,2,4,8,8,8
150 DATA 7192,20,24,254,9,31,17,20,127
160 DATA 7200,16,18,18,18,34,34,33,64
170 DATA 7208,64,64,64,64,65,127,3,255
180 DATA 7216,0,0,120,132,252,84,0,84
190 DATA 7224,64,64,70,137,144,160,248,248
200 DATA 7232,128,128,64,32,160,160,248,248
210 DATA 7240,65,118,20,20,20,20,31,31
220 DATA 7248,16,18,18,19,32,32,32,64
230 DATA 7256,128,255,0,255,128,128,128,128
240 DATA 7264,213,192,192,192,85,63,33,30
250 DATA 7272,0,0,0,0,0,62,65,127
260 DATA 7280,20,24,254,9,31,1,126,64
270 DATA 7288,0,0,0,2,1,249,5,2
280 DATA 7296,0,0,0,4,10,9,72,48
290 DATA 7304,240,144,144,176,128,128,156,148
300 DATA 7312,162,197,170,20,40,16,32,64
310 DATA 7320,62,127,107,203,67,65,62,28
320 DATA 7328,248,136,136,136,136,136,16,32
330 DATA 7336,0,0,0,1,3,6,28,0
340 DATA 7344,47,102,227,163,34,34,62,30
350 DATA 7352,224,0,0,128,192,112,0,0
360 DATA 7360,30,28,56,127,127,27,56,56
370 DATA 7368,63,44,102,255,255,36,60,28
380 DATA 7376,128,64,160,144,144,80,120,0
390 DATA 7384,30,55,99,99,99,99,231,231
400 DATA 7392,127,127,0,0,0,0,0,0
410 DATA 7400,251,250,99,98,34,34,62,30
420 DATA 7408,240,14,194,34,18,30,0,0
430 DATA 7416,0,63,63,0,0,0,0,0
440 DATA 7432,47,230,227,255,255,34,62,30
450 DATA 7448,252,132,120,0,0,0,0,0
460 DATA 7424,0,0,0,0,0,0,0,0,-1
470 PRINT"[CLEAR,DOWN18,RIGHT4]";:GOSUB 100
```

```
480 GET A$:IF A$=""THEN 480
490 PRINT TAB(3)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]";:GOSUB 110:GOSUB 70
500 PRINT TAB(4)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]";:GOSUB 100:GOSUB 90
510 PRINT TAB(5)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]";:GOSUB 110:GOSUB 70
520 PRINT TAB(6)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]";:GOSUB 100:GOSUB 90
530 PRINT TAB(7)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]";:GOSUB 110:GOSUB 70
540 PRINT TAB(8)"[UP4]PQ[SPACE,LEFT2,DOWN]R":GOSUB 70
550 PRINT"[HOME]";:FOR J=1 TO 19:GOSUB 80:NEXT J
560 FOR J=1 TO 5:PRINT TAB(8)"[UP,SPACE]@A[DOWN,LEFT2]C
    [SPACE,RIGHT2,SPACE,DOWN,LEFT3,SPACE]YZ[DOWN,LEFT2]["
    :GOSUB 90
570 PRINT TAB(8)"[UP3,RIGHT]N[UP]":GOSUB 90:NEXT J
580 FOR M=1 TO 3:PRINT TAB(8)"[DOWN]JKL[UP,LEFT]M[LEFT,
    DOWN2,SPACE,UP3]"
590 PRINT"[UP2]";:GOSUB 80:PRINT"[UP2]";:GOSUB 80
600 PRINT TAB(8)"[DOWN4,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,
    UP]PQ[LEFT,DOWN,LEFT]BR[LEFT2,DOWN]DEF[LEFT3,DOWN]I
    [SPACE]#":GOSUB 70
610 PRINT TAB(7)"[UP,SPACE,UP,LEFT,SPACE,UP,LEFT,SPACE,UP,
    LEFT,SPACE2]@A[SPACE,LEFT3,DOWN,LEFT]BC[SPACE,LEFT3,
    DOWN]DEF[SPACE,LEFT4,DOWN]GH#[SPACE]":PRINT"[UP5]";
    :GOSUB 80
620 GOSUB 80:PRINT TAB(13)"[SPACE,DOWN,LEFT3,BACK ARROW]
    !^[LEFT2,DOWN][[UP3]":GOSUB 70:NEXT M
630 FOR M=1 TO 5:PRINT TAB(9)"N[UP]O":GOSUB 70
    :PRINT TAB(9)"[UP,RIGHT]A":GOSUB 70:NEXT M
640 PRINT:FOR J=1 TO 9:PRINT TAB(11)"[POUND]]^[UP]"
    :GOSUB 90:PRINT TAB(11)"[SPACE]YZ[UP]":GOSUB 90
650 PRINT TAB(11)"[BACK ARROW]!^[UP]":GOSUB 90
    :PRINT TAB(11)"[SPACE]YZ[UP]":GOSUB 90:NEXT J
660 PRINT TAB(10)"[RVS,SHFT U,SHFT K,SHFT I,UP2]":GOSUB 90
    :PRINT TAB(7)"[RVS,SHFT U2,SPACE,SHFT K,SPACE,SHFT J,
    SHFT I2]":PRINT TAB(8)"[UP2,RVS,SHFT U2,UP,SHFT U,
    SHFT I,DOWN,LEFT2,SHFT N,SPACE,SHFT I2]"
670 GOSUB 70:PRINT TAB(7)"[RVS,SHFT J,SHFT M,SPACE,SHFT K,
    SHFT J,SHFT N,SPACE,SHFT K]":PRINT TAB(8)"[RVS,
    SHFT J2,SPACE,DOWN,LEFT3,SHFT J,SHFT K,SHFT J,SHFT K,
    SHFT J,SHFT K,LEFT3,UP,SHFT K3,UP3]":GOSUB 70
```

```
680 PRINT:FOR K=1 TO 7:PRINT TAB(9)"[RVS,SPACE,SHFT W,UP]
    X[DOWN2]*[UP2]":GOSUB 70:PRINT TAB(9)"[RVS,SHFT J,
    SPACE,SHFT K,DOWN,LEFT,SHFT N,SPACE,UP2]":GOSUB 70
690 PRINT TAB(10)"[UP,RVS,SHFT V,LEFT,SHFT U,SHFT I,SPACE,
    DOWN,LEFT4,SHFT J,SHFT U,SHFT I,SHFT K,SHFT U,DOWN,
    LEFT4,SHFT J,SHFT I,SHFT U,SHFT K,UP2]":GOSUB 70
    :NEXT K
700 GOSUB 70:PRINT TAB(8)"[UP,SPACE,UP,SPACE4]":GOSUB 70
    :PRINT TAB(7)"[DOWN,SPACE2,DOWN,LEFT,SPACE,DOWN,LEFT,
    SPACE,RIGHT4,SPACE,UP,LEFT,SPACE2,LEFT2,UP,SPACE2,UP,
    LEFT2,SPACE]"
710 GOSUB 70:PRINT TAB(10)"[UP]";:GOSUB 100
    :PRINT TAB(10)"[UP3]N[UP,LEFT]":GOSUB 70
720 PRINT TAB(9)"[UP,SPACE,DOWN,LEFT,SPACE,DOWN,LEFT,
    SPACE,DOWN,LEFT,SPACE,UP3,SPACE]";:GOSUB 110
    :PRINT TAB(11)"[UP3]N":GOSUB 70:GOSUB 70
730 PRINT TAB(12)"[UP,SPACE,UP,LEFT]O":GOSUB 70
    :PRINT TAB(11)"C[RIGHT,RVS,SHIFT *,SPACE]BELCH!"
740 GOTO 740
```

Dragon Power

```
10 POKE 36879,25:X=27:POKE 52,X:POKE 56,X:POKE 51,PEEK(55)
   :CLR
20 CS=256*PEEK(52)+PEEK(51)
30 FOR I=CS TO CS+511:POKE I,PEEK(I+32768-CS):NEXT
40 READ X:IF X<0 THEN 60
50 FOR I=X TO X+7:READ J:POKE I,J:NEXT:GOTO 40
60 POKE 36869,255:GOTO 460
70 FOR I=1 TO 300:NEXT:RETURN
80 DATA 7168,0,0,0,0,0,15,48,64
90 DATA 7176,0,1,3,3,3,247,15,3
100 DATA 7184,8,24,24,156,189,189,189,255
110 DATA 7192,64,64,194,226,230,230,247,255
120 DATA 7200,0,1,7,8,8,16,16,16
130 DATA 7208,0,255,48,168,168,152,64,32
140 DATA 7216,128,15,0,0,0,0,0,1
150 DATA 7224,2,241,0,0,0,0,1,128
160 DATA 7232,0,48,182,134,128,131,179,48
```

```
170 DATA 7240,0,0,28,34,65,65,65,65
180 DATA 7248,31,16,16,17,10,7,3,4
190 DATA 7256,255,32,64,128,0,252,255,1
200 DATA 7264,254,0,0,0,0,0,255,224
210 DATA 7272,14,17,32,32,32,17,206,127
220 DATA 7280,0,0,128,128,128,0,1,254
230 DATA 7288,65,65,65,65,65,129,1,1
240 DATA 7296,4,4,52,79,147,36,72,137
250 DATA 7304,1,0,1,254,65,64,128,0
260 DATA 7312,159,102,153,100,146,73,37,21
270 DATA 7320,128,0,0,128,127,32,32,64
280 DATA 7328,1,2,2,12,240,0,0,0
290 DATA 7336,0,0,0,3,12,16,32,224
300 DATA 7344,0,0,0,240,12,2,1,1
310 DATA 7352,1,1,1,1,1,129,65,65
320 DATA 7360,192,224,48,24,12,4,6,6
330 DATA 7368,32,32,32,32,16,16,16,248
340 DATA 7376,33,33,17,17,9,9,5,6
350 DATA 7384,0,0,0,0,0,254,1,0
360 DATA 7392,5,5,5,9,9,17,17,161
370 DATA 7400,0,0,0,0,3,60,192,63
380 DATA 7408,0,0,15,19,228,73,138,255
390 DATA 7432,4,4,2,3,2,252,0,255
400 DATA 7448,0,3,124,128,0,0,0,255
410 DATA 7456,193,129,1,2,2,12,16,224
420 DATA 7464,12,4,248,32,64,159,32,255
430 DATA 7472,0,0,0,56,68,68,40,16
440 DATA 7480,24,36,106,129,145,102,36,24
450 DATA 7424,0,0,0,0,0,0,0,0,-1
460 PRINT"[CLEAR]"
470 PRINT"[HOME,GREEN,DOWN17,RIGHT6]@ABC[DOWN,LEFT6]
    DEFGHI[DOWN,LEFT6]JKLMNO[DOWN,LEFT6]PQRS[RVS,SHIFT *,
    RVOFF]T"
480 PRINT"[HOME,DOWN17,RIGHT10,RVS,CMDR @2,RVOFF]UV[RVS,
    CMDR @,DOWN,LEFT3,SHFT G,RVOFF]W[SPACE]X[DOWN,LEFT6,
    RVS,CMDR @2,RVOFF]YZ[[POUND,DOWN,LEFT6]]^%!#$"
490 PRINT"[RIGHT4,RVS,BLACK]DRAGON[SPACE]POWER"
500 GOSUB 70:PRINT"[HOME,DOWN17,RIGHT5]&"
510 GOSUB 70:PRINT"[UP,RIGHT5,SPACE,UP,LEFT]'";
520 FOR X=1 TO 6
530 GOSUB 70:PRINT"[LEFT,SPACE,UP]'";:NEXT X
    :PRINT"[LEFT,SPACE]":GOTO 500
```

Quick Tricks for the VIC

by Karen Pierce

A mysterious syntax error that your VIC is too "tired" to fix, letters that print backwards on your screen and a display that might make you seasick. Try these quick tricks on your computer-using friends—if you don't mind having them not speaking to you for a while, that is. For the unexpanded VIC 20.

All work and no play makes VIC a dull toy.

If you're like me, you need a break now and then from serious programming. (Even if the end product is a game, the programming can get pretty serious!)

So here are some silly ideas for some silly tricks your VIC can perform.

Want to bewilder your friends (or parents)? Type this program in, type RUN, then call your unsuspecting VICtim over to the VIC.

```
10 PRINT "[CLEAR]"
20 PRINT "?SYNTAX":PRINT"[SPACE]
   ERROR[SPACE]IN[SPACE]30"
30 PRINT "READY."
40 PRINT "[RVS,SPACE]"
50 FOR T=1 TO 300:NEXT
60 PRINT "[UP,SPACE]"
70 FOR T=1 TO 300:NEXT
80 PRINT "[UP,RVS,SPACE]"
85 N=0
90 GET A$:IF A$=""THEN 50
120 PRINT "[UP]" SPC(N) A$:N=N+1
130 IF A$=CHR$(13) THEN 150
135 SV$=A$
140 GET A$:IF A$=""THEN 140
145 GOTO 120
150 IF SV$<>"T" AND SV$<>"
    [SHFT I]"THEN 210
155 PRINT "10[SPACE]REM[SPACE]
    ADDING[SPACE]PROGRAM
160 PRINT "20[SPACE]A=0:B=1:C=0
170 PRINT "30[SPACE]C=A+B
180 PRINT "40[SPACE]PRINT[SPACE]
    C:[SPACE]A=C
190 PRINT "50[SPACE]GOTO[SPACE]30
200 GOTO 30
210 PRINT "?VIC[SPACE]TIRED"
220 PRINT "NOT[SPACE]READY."
230 GOTO 40
```

Now say, "Can you help me figure out what's wrong?" What appears on the screen is:

```
?SYNTAX
 ERROR IN 30
 READY.
 ■
```

When he does a LIST, he sees a simple "program" with no discernable error in 30 or anywhere else! Try not to giggle while he is frowning and squinting. Should he type any character now, he will get a message saying:

```
?VIC TIRED
 NOT READY.
 ■
```

By now the friend has caught on, and is probably throwing something at you!

How did we do it? Mostly with simple PRINT statements. The "dummy" program listing is contained in lines 155-190. In lines 40-80 we create a blinking cursor and wait for the VICtim to type "LIST" or "L╮". If he types anything different we just go to 210, since we don't want to create an entire "pretend" version of the BASIC editor here, do we? (Remember, we are *playing*.)

Now here's one for another day and another audience, since your first dupe no longer believes a word you utter. Type in this program:

```
20 FOR I=7168 TO 7679
30 OL=PEEK(I+25600):NW=0
40 IF OL>127 THEN NW=NW+1:OL=
   OL-128
50 IF OL>63 THEN NW=NW+2:OL=OL-64
60 IF OL>31 THEN NW=NW+4:OL=OL-32
70 IF OL>15 THEN NW=NW+8:OL=OL-16
80 IF OL>7 THEN NW=NW+16:OL=OL-8
90 IF OL>3 THEN NW=NW+32:OL=OL-4
100 IF OL>1 THEN NW=NW+64:OL=OL-2
110 IF OL>0 THEN NW=NW+128:
    OL=OL-1
120 POKE I,NW: NEXT I
130 POKE 52,28:POKE 56,28:CLR
140 POKE 36869,255
150 FOR T=1 TO 700:NEXT
160 POKE 36869,240
170 FOR T=1 TO 700:NEXT
180 GOTO 140
```

Now type RUN, and watch the fun!

Try adding an END after line 140, then RUN it. Now you can clear the screen and create a mysterious message like:

!PLEH
DEPPART M'I
RETUPMOC EHT EDISNI

Is this silly enough for you?

To accomplish this totally useless effect, we had to create a set of special characters. The "picture" of each letter is stored in ROM as eight bytes, each of which represents one horizontal row of eight bits. To create a backwards letter, we had to note which bits are turned on in the usual character, and create a new character in which the *symmetrically opposite* bits were turned on. The IF statements in lines 40 thru 110 do that. OL stands for "OLd character", NW for "NeW character".

Then in lines 140-180 we changed location 36869 back and forth from its usual value, 240, which points to the normal character set in ROM, to 255, which points to our special backwards character set. So, with a time delay after each POKE, we could watch the characters flip-flop.

Someone might like to figure out a formula to turn the letters upside down, or make them lie flat on their backs.

This last one is not quite as silly; it might even have some (ugh!) practical uses. There are two special locations in the VIC RAM. One, 36865, determines the vertical orientation of the 21 × 22 screen. Its normal value is 25. The other, 36864, determines the horizontal orientation of the screen. Its normal value is 5.

To change the vertical just try:

POKE 36865, V

with V equal to anything from zero to 255.

OOPS! Did you lose your screen completely? Try a value closer to 25. Note that when the screen totally disappears you can still type a command and it will work, even though you can't see what you typed—spooky!

Changing the horizontal is really just as easy but there's a bit more to type:

POKE 36864,PEEK(36864)AND128OR H

with H equal to anything from zero to 255. The reasons for this formula are as obscure to me as they are to you. I just lifted it from the *VIC 20 Programmer's Reference Guide*.

Have fun experimenting. Fill your screen with interesting characters and write a simple loop to make the whole screen come alive in motion: gliding, marching, shaking, zooming, zigzagging.

Here is a program that will produce a circular (well, almost) motion along with a rather nauseating sound effect. I call it "Vertigo":

```
10 V=25:POKE 36878,15
20 FOR H=10 TO 5 STEP-.5
30 V=V+2
```

```
40 GOSUB 2000
50 NEXT H
60 FOR H=5 TO 0 STEP-.5
70 V=V-2
80 GOSUB 2000
90 NEXT H
100 FOR H=0 TO 5 STEP.5
110 V=V-2
120 GOSUB 2000
130 NEXT H
140 FOR H=5 TO 10 STEP.5
150 V=V+2
160 GOSUB 2000
170 NEXT H
180 GOTO 10
2000 POKE 36864,PEEK(36864)AND
     128 OR INT(H):POKE 36865,V
2010 POKE 36875,190-V
2020 FOR T=1 TO 10:NEXT
2030 RETURN
```

If you wish, change the value on line 2020 to make it whirl faster or slower. Or change the values in lines 30, 70, 110, and 150 to make the circle more elliptical.

Now, you *could* call your father over and say "Hey, Dad, our TV must be broken!" But maybe, especially if you might need him someday to help you with a real honest-to-goodness programming problem, you'd better not. **C**

Author's Note: *Much credit goes to Tyler Pierce, age seven, for the phony SYNTAX ERROR idea.*

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The Pleasures of the Joystick

by Felipe Lebron

You can use the Super Expander cartridge with your VIC 20 to read the joystick with ease. Just type and save these routines to make your programming a little simpler.

VIC 20 owners who read "Joysticks, Paddles and Light-Pen", explaining how to read the game port on the Commodore 64, in the Winter 1982 issue of *Power/Play* magazine were understandably envious. If only our computer had a similar single address that could be used to read the joystick! Envy no more. The versatile *Super Expander* cartridge provides a function, RJOY(x), which returns the position of the joystick in almost precisely the same way as the Commodore 64's single address.

Until now, routines designed to read the position of the joystick, which have appeared in this magazine and elsewhere, all have had one thing in common: they require POKEing and PEEKing into four different addresses and some rather fancy bit manipulation. The possibilities for error are numerous. Let's try something different. Plug in your *Super Expander* cartridge and your joystick and type in the following lines:

```
10 J=RJOY(0)AND15:F=RJOY(0)AND
   128:PRINTJ,F:GOTO10
```

Your screen will soon fill with two columns of zeros. If you now move the joystick, the values of the left column will change according to the following chart:

Position of Joystick	**Value of Left Column**
CENTER	0
UP	1
DOWN	2
LEFT	4
UP & LEFT	5
DOWN & LEFT	6
RIGHT	8
UP & RIGHT	9
DOWN & RIGHT	10

Similarly, pressing the fire button will change the value of the right column from 0 to 128.

Some users will be surprised that the RJOY(x) function can be used in the text mode, i.e., one need not be in the high-resolution or multi-color mode. This is one important fact the *Super Expander* instruction manual fails to mention and which adds true versatility to the cartridge.

The RJOY(x) function can be used in two ways. Those who prefer the X/Y coordinate method of POKEing characters on the screen can employ a directed GOTO to change the values of X and Y. But there is an easier method. The subroutine in lines 1000 to 1020 below will return X1 and Y1 values of zero, −1 or +1 according to the position of the joystick. Try it. Lines 10 to 30 serve only to illustrate the operation and your own program would take their place.

```
10 GOSUB1000:PRINTX1;Y1;:IFF=
   0THEN30
20 PRINT"   FIRE!":GOTO10
30 PRINT:GOTO10
1000 J=RJOY(0)AND 15:F=RJOY(0)
     AND128
1010 K=J/4:L=INT(K):M=4*(K-L)
1020 X1=(L=1)-(L=2):Y1=(M=1)
     -(M=2):RETURN
```

For those who prefer the direct method of POKEing there's an equally simple subroutine:

```
10 GOSUB1000:PRINTP;:IFF=0THEN30
20 PRINT"   FIRE!":GOTO10
30 PRINT:GOTO10
1000 J=RJOY(0)AND 15:F=RJOY
     (0)AND128
```

```
1010 K=J/4:L=INT(K):M=4*(K-L)
1020 P=(L=1)-(L=2)+(M<>0)*(1.
     5-M)*44:RETURN
```

Expressions such as (L=2) need not be confusing. Their value is either −1 or zero, depending on the truth of the expression. Pretty much like an IF statement. If L=2, (L=2) will equal −1, otherwise it is zero. The expression (M<>0) will equal −1 if, and only if, M is *not* zero. In all other cases it is zero.

Depending on which of the above programs you run, the screen will fill with one or two columns of zeros. The chart below shows how values of X1, Y1 and P will change according to the position of the joystick:

Position of Joystick	**PROGRAM 1**		**PROGRAM 2**
	X1	**Y1**	**P**
CENTER	0	0	0
UP	0	−1	−22
DOWN	0	1	22
LEFT	−1	0	− 1
UP & LEFT	−1	−1	−23
DOWN & LEFT	−1	1	21
RIGHT	1	0	1
UP & RIGHT	1	−1	−21
DOWN & RIGHT	1	1	23

In both programs, pressing the fire button will cause the word "FIRE!" to appear on the right side of the screen.

So envy no more. Put your *Super Expander* to work instead. **C**

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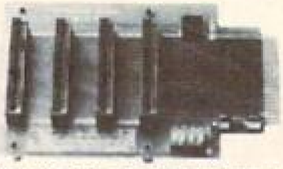
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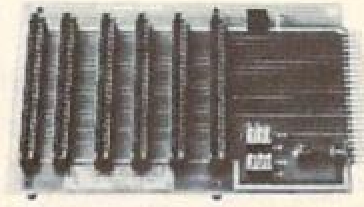
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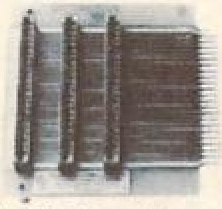
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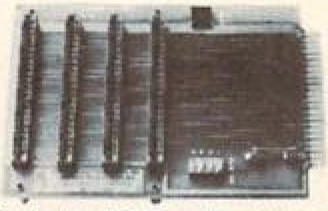
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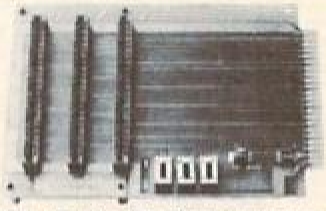
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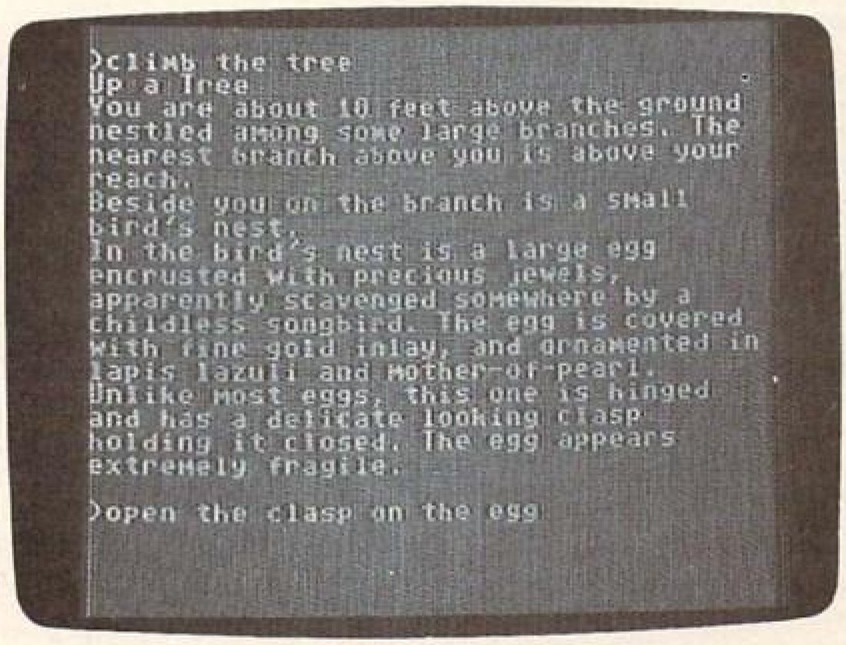

```
>climb the tree
Up a Tree
You are about 10 feet above the ground
nestled among some large branches. The
nearest branch above you is above your
reach.
Beside you on the branch is a small
bird's nest.
In the bird's nest is a large egg
encrusted with precious jewels,
apparently scavenged somewhere by a
childless songbird. The egg is covered
with fine gold inlay, and ornamented in
lapis lazuli and mother-of-pearl.
Unlike most eggs, this one is hinged
and has a delicate looking clasp
holding it closed. The egg appears
extremely fragile.

>open the clasp on the egg
```

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Sundial

by Paul R. Machula

Use this program for the unexpanded VIC 20 or Commodore 64 as an aid in creating your own sundial.

As a resident of Arizona I am an avid fan of our local resident star, the sun. I am also a great admirer of the friendly computer, Commodore's VIC 20. Recognizing the fact that the sun follows natural laws and that a computer is particularly adept in manipulating numbers, I decided to use my computer as an aid in producing one of my favorite solar instruments, a sundial. The program "Sundial" will help anyone else who wishes to make their own dial.

It may be helpful to those who are unacquainted with dials (as well as "Sundial") to consider the following points:

1. Time indicated on a sundial is not standard ("watch") time. For standard time, corrections must be made for the local longitude difference and the equation of time. If these values are desired they are obtainable from almost any book on dialling.
2. All dials are accurate only for the latitude for which they are made. It is for this reason that the INPUT statement on latitude is included in "Sundial" (line ten).
3. Hour angles are measured from the center of dial (low point of gnomon), not from the foot of the high point of the gnomon. (The gnomon is the wedge-shaped piece that casts a shadow on the dial.)
4. The angle of the style (upper edge of gnomon) must be equal to the latitude of the dial's position. The gnomon must be mounted perpendicular to the dial face.
5. In order to function properly the dial must be oriented correctly: the dial face must be level and the high point of the gnomon must point, not towards the sun, but to true north (pole star, not magnetic north).
6. The lengths of the hour lines and of the style are irrelevant; rather, their angles are essential.
7. "Sundial" uses decimal degrees. If degrees-minutes-seconds are desired the program must be slightly modified.
8. The time values in "Sundial" occur at five-minute intervals.
9. The hour angles indicated in "Sundial" are actually applicable to two time values (a.m. and p.m.). For example, the hour angle for time value 11:55 a.m. is the same as 12:05 p.m.; 11:50 a.m. is the same as 12:10 p.m.; 11:45 a.m. is 12:15 p.m., etc.
10. "Sundial" prints the time values and hour angles onto the screen continuously (no scroll stop). The operator may wish to use the RUN-STOP key together with the command CONT to stop the scrolling, allowing time to copy the values. The CONTROL key could also be used.

For those who are interested, further information regarding sundials can be found in almost any library. You will discover that the calculations found in most dialling books can readily be adapted to the VIC 20.

Happy—painless—dialling! **C**

Sundial

```
3 REM ***SUNDIAL***BY PAUL R. MACHULA
4 REM GLOBE, AZ 85501
6 A$="***********************":PRINT"[CLEAR,DOWN7]"A$
7 PRINT"[RIGHT2]HOUR[SPACE]ANGLES[SPACE]FOR[SPACE]A
  [SPACE5]HORIZONTAL[SPACE]SUNDIAL":PRINT:PRINT A$
8 FOR A=1 TO 10^4:NEXT
9 PRINT"[CLEAR]"A$"[RIGHT2]ENTER[SPACE]YOUR[SPACE]
  LATITUDE[SPACE3](IN[SPACE]DECIMAL[SPACE]DEGREES)"A$
10 INPUT Q
32 PRINT"[CLEAR]"
42 REM DEG-RAD CONVERSION
45 DR=[PI]/180
46 RD=180/[PI]
50 L=Q*DR
55 PRINT"TIME","HOUR[SPACE]ANGLES":PRINT A$
56 REM BEGIN HOUR ANGLE COUNTER
60 X=0
65 REM BEGIN HOUR LOOP
70 FOR Y=11 TO 5 STEP-1
100 IF Y=5 THEN 210
105 REM BEGIN MINUTE LOOP
110 FOR Z=60 TO 5 STEP-5
113 REM BEGIN PRINT FORMAT
120 IF Y=11 AND Z=60 THEN PRINT"[SPACE]12[SPACE]
    :[SPACE]00","[SPACE]0.00":PRINT
125 IF Y=11 AND Z=60 THEN 190
130 IF Z=60 THEN PRINT Y+1":[SPACE]00",
135 IF Z=60 THEN 160
140 IF Z=5 THEN PRINT Y":[SPACE]05",
150 IF Z<>5 THEN PRINT Y":";
155 REM CALCULATE HOUR ANGLES
160 X=X+1.25*DR
165 H=ATN(TAN(X)*SIN(L))*RD
166 IF Z=5 THEN 180
167 REM FINISH PRINT FORMAT
170 IF Z<>60 THEN PRINT Z,
180 PRINT H
190 NEXT Z
200 NEXT Y
210 PRINT"[SPACE]6[SPACE]:[SPACE]00","[SPACE]90.00"
215 PRINT:PRINT"*********END**********"
```

Raster Interrupts On The Commodore 64 Part 1: Introduction and Theory

by Dave Berezowski
Updated from *The Transactor,* July, 1983

One feature of the Commodore 64 that is probably least understood and most powerful is the ability to "muck-about" with the raster beam. Many things are possible, such as continuous smooth scrolling of the entire screen, mixed-graphic modes (i.e., text and hi-res), flicker-free animation, more than eight sprites on the screen at one time, etc. In this and subsequent articles, I will attempt to explain how raster interrupts work and how you can use them. I'll assume that you have first learned the basic concept of interrupt coding, and how the other features of the VIC II chip work, such as background color, border color, etc. Raster interrupts will allow you to use these features to obtain more interesting effects in your programs.

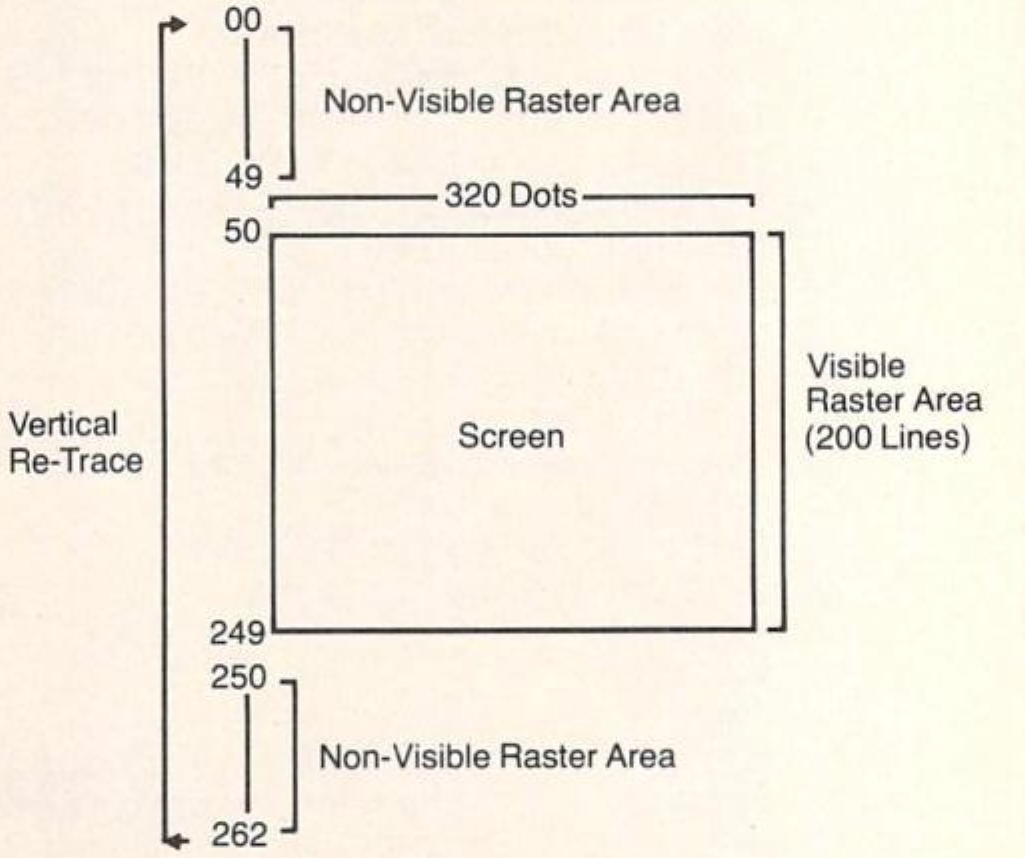
Let's stop here for a moment and explain some terms we'll need to know. The first thing that you need to know is how the picture gets drawn on your T.V. or monitor. Imagine that the screen is a grid of 320 dots across by 200 dots down. Each dot, sometimes called a "pixel", is made of a phosphorescent material that glows when struck by electrical energy. Color pixels are made of three bits of phosphor—red, green, and blue. This combination allows for all the colors by hitting each dot with a controlled amount of energy. However, to avoid potentially confusing details concerning color theory, we'll assume each dot will glow in the same color, or simply "on" or "off".

Energy is supplied to each dot by the cathode ray or electron beam that is controlled by that large cylindrical object on the back of the picture tube. Most of you have probably seen this; it's covered with several wrappings of copper wire and referred to as the electron gun. The electron gun can direct the beam at any dot on the screen. By rapidly switching the beam on or off, each dot either glows or does not glow. Since the cathode ray tube (CRT) is not very smart, it doesn't know that it's drawing letters, numbers, sprites, etc. It only knows that it's turning dots on or off. The end result is a pattern of on and off dots that forms the picture that we see, something we all merely take for granted.

The beam starts on the top line (line 1) of the screen and "draws" 320 dots across from left to right. Then it zips back to the beginning of line two, and draws 320 more dots. Each line of 320 dots is known as a "raster". The beam essentially draws a whole line in one swoop, so we refer to it as the "raster beam", a term that fits very nicely since we're dealing with raster interrupts.

A "raster interrupt", therefore, does exactly what the term implies. It allows us to "interrupt" the process of drawing the entire screen and perform some operation in between two "rasters". The two can be ANY two of your choosing, and the operation, for example, might be a change of background color, so that the top half of the screen has a background

Figure 1. Vertical Retrace



color of red and the bottom half is in blue. We'll be looking at this later, but taking it one step further, we could change the background color back to red (or another color) just before reaching the bottom of the screen. And ultimately, we could change the background color for every raster on the screen. All this and more is possible using the raster interrupt feature.

Once again then, the raster beam starts drawing rasters from line one at the top of the screen, until it gets down to the bottom of the screen at line 200. After it finishes drawing line 200 it zips back up to the top of the screen (known as "vertical retrace") and starts all over again. It draws a complete picture on your screen 60 times per second. So, we could say that every line gets re-drawn once every 1/60th of a second or every 16,667 micro-seconds (assuming that the Commodore 64 has a clock speed of 1 Mhz.) In Figure 1 we take a pictorial look at what's happening.

Now I should explain something here so as not to confuse you. The **full-range** of the raster beam is from raster line zero (RL0) to raster line 262 (RL262). However, the visible raster lines are from RL50 to RL249. What this means is that when the raster beam is drawing the first line of dots on your screen, it is really on its fiftieth line. Therefore, raster lines 0-49 and 250-262 are actually drawn off screen and make up what I referred to earlier as the "vertical-retrace". (Incidentally, the raster beam values and the sprite positions are the same. So when a sprite is at y position 51, it is also on the fifty-first raster beam.)

The Raster Beam Registers

Now that you understand (I hope) how the raster beam works, I can introduce some of the registers of the video chip that we'll need to use. Familiarize yourself with register 17 ($D011 or 53265) and register 18 ($D012 or 53266) which are dual purpose registers. When you read them, they return the current position of the raster beam (be it on or off screen). When you write to them, it sets up a raster-compare value which can generate a raster interrupt when the raster beam position equals the number that you put in the register. It is like saying to the video chip, "Tell me when the raster beam is at position xxx".

Note that because the raster beam can have a value greater than 255, we need nine bits to tell us its position. So, the eighth bit of register 17 ($D011 or 53265) is used and is actually the ninth bit of the raster value. Naturally, bits 1-8 of register 18 are bits 1-8 of the raster beam. To read the raster beam you could perform the following:

```
10 RV=PEEK(53266)+PEEK(53265)
   AND128)*256
20 PRINT"RASTER IS AT LINE ";RV
```

To write to the raster register to set up a raster-compare value we could code: (remember, we must not disturb the other bits in register 17)

```
10 RC=250:REM END OF SCREEN,
   FOR EXAMPLE
20 POKE53266,RC AND 255:REM PUT
   LOWER 8 BITS IN REGISTER 17
30 POKE53265,(PEEK(53265) AND
   127) OR (INT(RC/256)*128)
40 PRINT"RASTER-COMPARE NOW
   SET AT LINE ";RC
```

The next two registers we have to be aware of are registers 25 ($D019 or 53273) and 26 ($D01A or 53274). Register 25 is the interrupt status register. It tells us who has generated an interrupt on the IRQ line (Interrupt ReQuest). The interrupts can come from the light pen, sprite-sprite collisions, sprite-background collisions or raster-compare matches. In this case we are only concerned with raster-compare interrupts and need only look at bit 0 of register 25. Here is a description of register 25:

Register 25 ($D01A or 53274)
Interrupt Status/Clear Register

BIT 7: has anybody requested an IRQ?
BIT 3: has a light pen IRQ been requested?
BIT 2: has a sprite-to-sprite IRQ been requested?
BIT 1: has a sprite-to-background IRQ been requested?

BIT 0: has a raster-compare IRQ been requested?

A zero in the corresponding bit position means that an IRQ has not been requested, whereas a one means that an IRQ has been requested.

This register is also used to clear the interrupt status. You must write a one back to the corresponding bit of the interrupt that you serviced. Example: Let's say that a raster-compare interrupt occurs and that you service (take care of) it and return. If you forget to tell the video chip that you serviced the interrupt, as soon as you exit from the interrupt the CPU will think the video chip has another interrupt needing service. Thus your machine will just sit there and constantly interrupt itself. (From your point of view, the machine will have appeared to have crashed!) So as I said, to clear the interrupt you must write a one to the bit of the interrupt that you serviced. In this case we would code:

```
POKE 53274,PEEK(53274) OR 1
```

Register 26 is the interrupt-enable register. It tells the system which interrupt it should recognize. That is, a raster-compare interrupt could occur BUT if you haven't enabled it, then it will be ignored. For convenience sake register 26 is laid out the same as register 25 with respect to the ordering of the different types of interrupts:

Register 26 ($D01B or 53275)
Interrupt Enable Register

BIT 3: are light pen IRQs enabled?
BIT 2: are sprite-to-sprite IRQs enabled?
BIT 1: are sprite-to-background IRQs enabled?
BIT 0: are raster-compare IRQs enabled?

A zero in the corresponding bit position means that an IRQ has not been enabled, whereas a one means that an IRQ has been enabled.

One more register to worry about and then we can get into an example. First some background info. Every 1/60 of a second the 6526 (CIA #1) located at $DC00-DC0F (56320-56335) generates an interrupt on the IRQ line. It does this so that your 64 can flash the cursor, update the time-clock, check the stop-key, read the keyboard, etc. So unless we are working deep within machine language and don't need BASIC, we better make sure that this routine is still being called or else we won't have a cursor, can't press the stop-key, etc. We are left with three choices when dealing with raster-interrupts in what to do with the normal interrupt as follows:

1) We can leave this routine alone and allow it to occur normally every 1/60 of a second. But now we are going to have two interrupts occurring every 1/60 of a second, our raster-compare IRQ and the normal IRQ. There's nothing wrong with this, just so long as you check which interrupt occurred so that you can service the proper one.

2) We can disable the normal IRQ, but jump to it after we have finished doing our stuff. So we will have only one interrupt occurring but it will be performing two functions. (We must jump to the normal IRQ routine every 1/60 of a second if we want the use of the cursor, stop key, etc.). This is the method I chose in the program that follows the article.

3) If we don't need BASIC at all then we can disable the normal IRQ routine and instead of jumping to it, exit our routine with the following code:

PLA : TAY : PLA : TAX : PLA : RTI.
(note: this piece of coding is located at $FEBC)

For those of you who don't know, this code restores the status of the X, Y and A registers before returning from the interrupt.

Anyway, we better get back to the CIA. The part of the CIA #1 we need to worry about is $DC0E (56334). It controls all sorts of things, but the main thing is that bit zero controls whether timer A is running or not. Timer A counts down to zero every 1/60 of a second and generates an interrupt. If we stop timer A, then no normal IRQ interrupts will occur:

CIA #1 Control Register
($DC0E or 56334) Bit Description

7 Time of day clock freq : 1-50Hz, 0-60Hz
6 Serial port I/O mode : 1-output, 0-input

5 Timer A counts : 1-cnt sgnls, 0-system 02 sgnls
4 Force load timer A : 1-yes, 0-no
3 Timer A run mode : 1-one, 0-continuous
2 Timer A output on PB6 : 1-toggle, 0-pulse
1 Timer A output on PB6 : 1-yes, 0-no
0 Start/Stop Timer A : 1-start, 0-stop

To stop timer A we code:

```
POKE 56334,PEEK(56334) AND 254
```

To start timer A we code:

```
POKE 56334,PEEK(56334) OR 1
```

NOTE: I must point out that all of the examples I have been giving you are in BASIC for readability sake only. BASIC is far too slow for working with raster interrupts. You must code in machine language. For example:

```
POKE 56334,PEEK(56334) AND 254
```

would become...

```
LDA $DC0E
AND #254
STA $DC0E
```

Let's leave all the technical stuff for now and apply what we have learned. Below is a program (a BASIC loader and the documented assembly source file) to give us a two-color screen. The top half color of the screen can be controlled by POKE 24582, ch and the bottom half by POKE 24581, cl (ch and cl range from 0-15). Refer to Figure 2 to see what's going on.

Next Issue:

A) For you technical types, I'll go into the timing constraints of raster interrupts (time taken to draw one raster line, total cycle time, vertical-retrace time, etc.) and why you need to know this stuff.

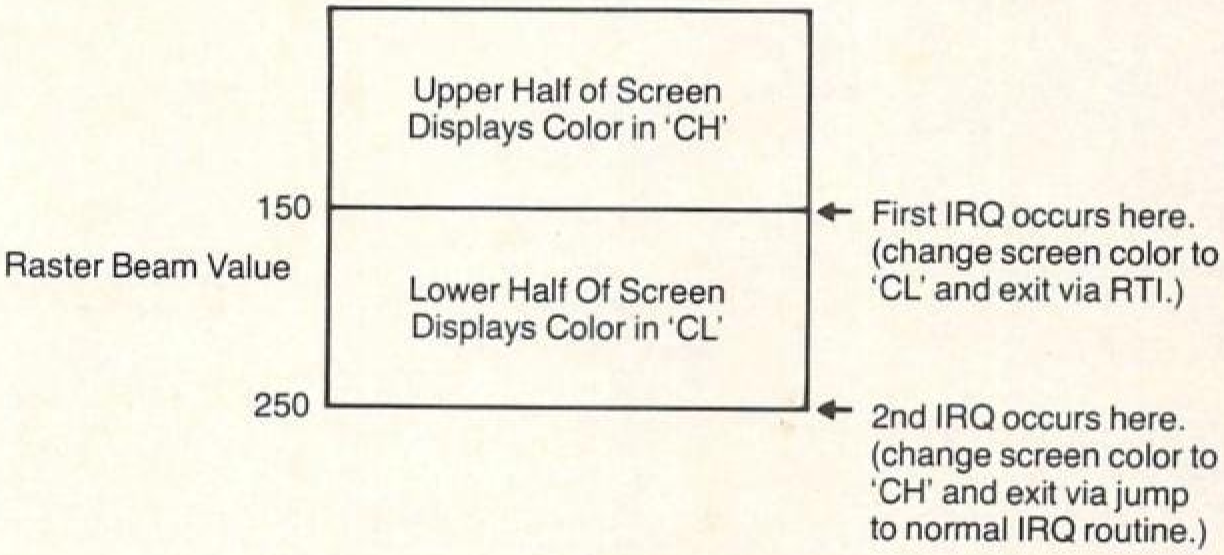
B) How to get a mixed-mode screen. We'll end up with 20 lines of hi-res and five lines of text on the same screen.

C) ???

In future articles, I'd like to go into the art of smooth scrolling, flicker-free animation, more than eight sprites on one screen, ???.

Digest what you learned for now and I'll see you next issue. **C**

Figure 2.


Upper Half of Screen Displays Color in 'CH'
150
Raster Beam Value
Lower Half Of Screen Displays Color in 'CL'
250
First IRQ occurs here. (change screen color to 'CL' and exit via RTI.)
2nd IRQ occurs here. (change screen color to 'CH' and exit via jump to normal IRQ routine.)

Raster Interrupts on the Commodore 64: BASIC Loader

```
100 REM RASTER.BAS
110 GOSUB 1000
120 Z=6*4096:SYS Z
130 R1=Z+4:R2=Z+3:R3=Z+6:R4=Z+5
140 C1=150:C2=250:C3=0:C4=1
150 GET A$:IF A$=""THEN 150
160 IF A$="[DOWN]"THEN C1=C1+1 AND 255:GOTO 230
170 IF A$="[UP]"THEN C1=C1-1 AND 255:GOTO 230
180 IF A$="[RIGHT]"THEN C2=C2+1 AND 255:GOTO 230
190 IF A$="[LEFT]"THEN C2=C2-1 AND 255:GOTO 230
200 IF A$="[F1]"THEN C3=C3+1 AND 15:GOTO 230
210 IF A$="[F3]"THEN C4=C4+1 AND 15:GOTO 230
220 GOTO 150
230 POKE R1,C1:POKE R2,C2:POKE R3,C3:POKE R4,C4:GOTO 150
240 :
250 REM CURSOR-UP MOVES R1 UP
260 REM CURSOR-DOWN MOVES R1 DOWN
270 REM CURSOR-RIGHT MOVES R2 DOWN
280 REM CURSOR-LEFT MOVES R2 UP
290 REM F1 BUMPS TOP COLOR
300 REM F3 BUMPS BOTTOM COLOR
1000 FOR J=24576 TO 24698
1010 READ X:CH=CH+X
1020 POKE J,X:NEXT
1030 IF CH<>13196 THEN PRINT"DATA[SPACE]ERROR":STOP
1040 RETURN
1050 DATA  76,  9, 96,170,170,170,170,170
1060 DATA 170,120,169,  0,141, 14,220,173
1070 DATA  20,  3,141,  7, 96,173, 21,  3
1080 DATA 141,  8, 96,169, 78,141, 20,  3
1090 DATA 169, 96,141, 21,  3,169,150,141
1100 DATA   4, 96,169,250,141,  3, 96,173
1110 DATA  17,208, 41,127,141, 17,208,173
1120 DATA   4, 96,141, 18,208,169,  0,141
1130 DATA   6, 96,169,  1,141,  5, 96,169
1140 DATA   1,141, 26,208, 88, 96,172, 18
1150 DATA 208,162,  2,204,  3, 96,240,  7
1160 DATA 136,204,  3, 96,240,  1,202,189
1170 DATA   4, 96,141, 33,208,189,  2, 96
1180 DATA 141, 18,208,173, 25,208,141, 25
1190 DATA 208,224,  1,208,  3, 76,188,254
1200 DATA 108,  7, 96
```

Raster Interrupts: Assembly Source File

```
;RASTER.S
;
;********************************************************************
;* ROUTINE TO SPLIT THE DISPLAY SCREEN TO CREATE A TWO-COLOR        *
;* BACKGROUND.  RAST1 IS THE RASTER-COMPARE VALUE FOR THE FIRST     *
;* INTERRUPT AND DETERMINES WHERE THE BOTTOM SCREEN COLOR WILL      *
;* START, THE COLOR IS DETERMINED BY BOTCOL.  RAST2 IS THE          *
;* RASTER-COMPARE VALUE FOR THE SECOND INTERRUPT AND SWITCHES THE   *
;* BACKGROUND COLOR TO TOPCOL AT THAT POINT.  IF RAST2 IS LESS THEN *
;* 250 THEN THE REST OF THE BOTTOM OF THE SCREEN AS WELL AS THE TOP *
;* OF THE SCREEN (UP TO RAST1) WILL HAVE A COLOR OF TOPCOL.         *
;********************************************************************
;
;DAVID BEREZOWSKI / AUG 83
;
;CONSTANTS
;
IRQVEC = $0314          ;IRQ JUMP VECTOR.
VICII  = $D000          ;START OF VICII CHIP.
RASTHI = VICII+17       ;RASTER COMPARE HI REGISTER
RASTLO = VICII+18       ;RASTER COMPARE LOW REGISTER
VICIRQ = VICII+25       ;INTERRUPT STATUSCLEAR REGISTER
VICENA = VICII+26       ;INTERRUPT ENABLE REGISTER
BGCOL0 = VICII+33       ;BACKGROUND COLOR REGISTER
CIACRA = $DC0E          ;CIA CONTROL REGISTER A.
RTIEXT = $FEBC          ;RTI EXIT ROUTINE.
;
;
;INITIALIZE INTERRUPT SYSTEM (JUMP VECTOR).
;
       * = $6000
;
       JMP INIT
;
;VARIABLES
;
RAST2  *=*+1            ;SECOND RASTER COMPARE VALUE (@ 24579).
RAST1  *=*+1            ;FIRST RASTER COMPARE VALUE (@ 24580).
;
BOTCOL *=*+1            ;BOTTOM BACKGROUND COLOR (@ 24581).
TOPCOL *=*+1            ;TOP BACKGROUND COLOR (@ 24582).
;
IRQSAV *=*+2            ;ORIGINAL IRQ VECTOR.
;
```

```
 INIT   SEI                 ;DISABLE INTERRUPTS.
 ;
        LDA #0
        STA CIACRA          ;DISABLE 6526 INTERRUPTS.
 ;
        LDA IRQVEC
        STA IRQSAV
        LDA IRQVEC+1
        STA IRQSAV+1        ;SAVE ORIGINAL IRQ VECTOR.
 ;
        LDA #<SERVIC
LINE


        STA IRQVEC
        LDA #>SERVIC
        STA IRQVEC+1        ;INIT IRQ VECTOR TO POINT TO IRQ SERVICE CODE.
 ;
        LDA #150
        STA RAST1           ;INIT FIRST RASTER-COMPARE POINT.
        LDA #250
        STA RAST2           ;INIT SECOND RASTER-COMPARE POINT.
 ;
        LDA RASTHI
        AND #%01111111
        STA RASTHI
        LDA RAST1
        STA RASTLO          ;INIT RASTER COMPARE TO FIRST RASTER VALUE.
 ;
        LDA #0
        STA TOPCOL          ;INIT TOP COLOR TO BLACK.
        LDA #1
        STA BOTCOL          ;INIT BOTTOM COLOR TO WHITE.
 ;
        LDA #1
        STA VICENA          ;ENABLE RASTER COMPARE INTERRUPTS.
 ;
        CLI                 ;ENABLE INTERRUPTS.
        RTS                 ;RETURN.
 ;
 ;MAIN INTERRUPT SERVICE CODE.
 ;
 SERVIC LDY RASTLO
        LDX #2              ;ASSUME SECOND INTERRUPT.
```

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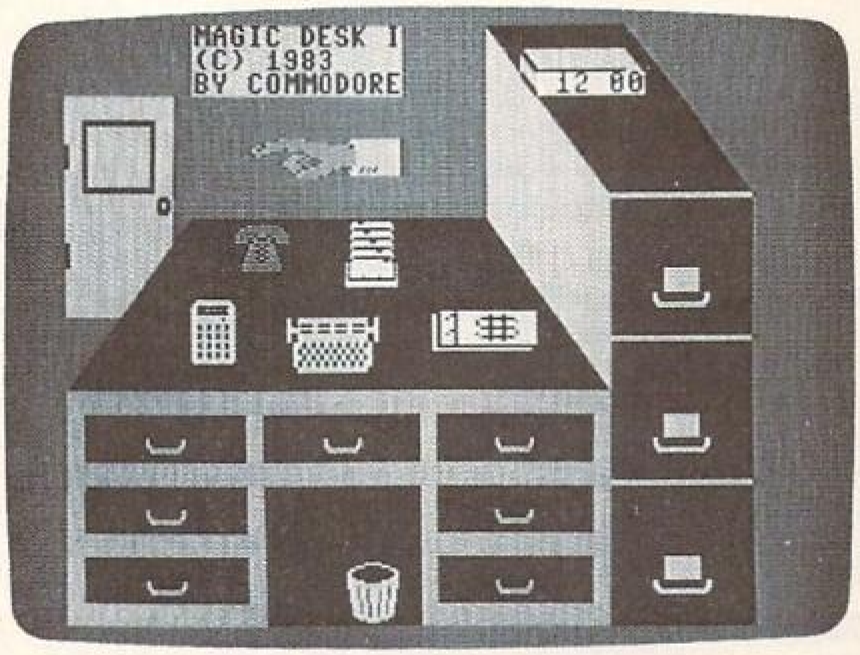

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```
        CPY RAST2         ;IS THIS THE SECOND INTERRUPT?
        BEQ SKIP01        ;YES
        DEY
        CPY RAST2         ;FUDGE FOR RASTER-BEAM TIMING ERROR.
        BEQ SKIP01        ;SEE EXPLANATION NEXT ARTICLE.
        DEX               ;NO, SO SET INDEX FOR 1ST INTERRUPT.
;
SKIP01  LDA BOTCOL-1,X
        STA BGCOL0        ;SET BACKGROUND COLOR.
;
        LDA RAST2-1,X
        STA RASTLO        ;SET RASTER-COMPARE FOR NEXT RASTER INTERRUPT.
;
        LDA VICIRQ
        STA VICIRQ        ;ACKNOWLEDGE THAT THE INTERRUPT WAS SERVICED
;
        CPX #1            ;IS THIS THE FIRST INTERRUPT?
        BNE EXIT2         ;NO
;
EXIT1   JMP RTIEXT        ;RETURN FROM FIRST INTERRUPT
;
EXIT2   JMP (IRQSAV)      ;PERFORM NORMAL IRQ ROUTINE
;
        .END
```

Medical Age Test for the Commodore 64

by Jim Branberg

This novel program is based on a quiz published in the August, 1982, issue of Changing Times. *After you answer the questions, you get the good (or bad) news—your* medical *age (as opposed to your chronological age), based on how well (or badly) you treat your body.*

Medical Age Test

```
0 REM **PROGRAM BY JIM BRANBERG**  BASED ON A QUIZ IN 'CH
  ANGING TIMES' 8/82 PGS. 33-37
10 POKE 36879,157:Z=0
15 PRINT"[CLEAR,RVS,BLUE,SPACE5]WHAT'S[SPACE]YOUR[SPACE11]
   MEDICAL[SPACE]AGE?[SPACE5]"
20 INPUT"YOUR[SPACE]PRESENT[SPACE]AGE";A
25 PRINT"[RVS]DISPOSITION"
30 PRINT"[SPACE]1.[SPACE]EASY[SPACE]GOING","[SPACE]2.
   [SPACE]AVERAGE"
35 PRINT"[SPACE]3.[SPACE]TENSE[SPACE]OFTEN"
   :INPUT"(1,2,OR[SPACE]3)";B
40 IF B=1 THEN Z=Z-3
45 IF B=3 THEN Z=Z+6
50 PRINT"[RVS]EXERCISE"
55 PRINT"[SPACE]1.[SPACE]ACTIVE[SPACE]EMPLOYMENT,[SPACE4]
   OR[SPACE]REG.[RIGHT]EXERCISE","[SPACE]2.[SPACE]
   MODERATE"
65 PRINT"[SPACE]3.[SPACE]NONE":INPUT"(1,2,OR[SPACE]3)";C
70 IF C=1 THEN Z=Z-12
75 IF C=3 THEN Z=Z+12
80 PRINT"[RVS]HOME[SPACE]ENVIROMENT"
85 PRINT"[SPACE]1.[SPACE]PLEASANT","[SPACE]2.[SPACE]
   AVERAGE"
95 PRINT"[SPACE]3.[SPACE]UNUSUAL[SPACE]TENSION"
   :INPUT"(1,2,OR[SPACE]3)";D
100 IF D=1 THEN Z=Z-6
105 IF D=3 THEN Z=Z+9
110 PRINT"[RVS]JOB[SPACE]SATISFACTION"
115 PRINT"[SPACE]1.[SPACE]ABOVE[SPACE]AVERAGE","[SPACE]2.
    [SPACE]AVERAGE"
125 PRINT"[SPACE]3.[SPACE]DISCONTENTED"
    :INPUT"(1,2,OR[SPACE]3)";E
130 IF E=1 THEN Z=Z-3
```

```
135 IF E=3 THEN Z=Z+6
140 PRINT"[RVS]AIR[SPACE]POLLUTION"
145 PRINT"[SPACE]1.[SPACE]NO[SPACE]EXPOSURE","[SPACE]2.
    [SPACE]MODERATE[SPACE]CONTACT"
150 PRINT"[SPACE]3.[SPACE]SUBSTANTIAL[SPACE11]EXPOSURE"
    :INPUT"(1,2,OR[SPACE]3)";F
155 IF F=2 THEN Z=Z+3
157 IF F=3 THEN Z=Z+9
160 PRINT"[RVS]SMOKING[SPACE]HABITS"
165 PRINT"[SPACE]1.[SPACE]NONSMOKER","[SPACE]2.[SPACE]
    OCCASIONAL","[SPACE]3.[SPACE]1[SPACE]PACK[SPACE]A
    [SPACE]DAY"
180 PRINT"[SPACE]4.[SPACE]2[SPACE]PACKS,[SPACE]OR[SPACE]
    MORE":INPUT"(1,2,3,OR[SPACE]4)";G
185 IF G=1 THEN Z=Z-6
190 IF G=3 THEN Z=Z+12
195 IF G=4 THEN Z=Z+24
200 PRINT"[RVS]DRINKING[SPACE]HABITS"
205 PRINT"[SPACE]1.[SPACE]SELDOM",,"[SPACE]2.[SPACE]
    MODERATE"
215 PRINT"[SPACE]3.[SPACE]HEAVY":INPUT"(1,2,OR[SPACE]3)";H
220 IF H=1 THEN Z=Z-6
225 IF H=2 THEN Z=Z+6
230 IF H=3 THEN Z=Z+24
235 PRINT"[RVS]EATING[SPACE]HABITS"
240 PRINT"[SPACE]1.[SPACE]LOW[SPACE]FAT[SPACE]DIET","
    [SPACE]2.[SPACE]HIGH[SPACE]PROTEIN[SPACE10]INTAKE"
250 PRINT"[SPACE]3.[SPACE]HIGH[SPACE]CHOLESTEROL[SPACE6]
    INTAKE":INPUT"(1,2,OR[SPACE]3)";I
255 IF I=1 THEN Z=Z-6
260 IF I=2 THEN Z=Z+6
265 IF I=3 THEN Z=Z+6
270 PRINT"[RVS]CAFFEINE[SPACE]INTAKE"
275 PRINT"[SPACE]1.[SPACE]LOW",,"[SPACE]2.[SPACE]MODERATE
    [SPACE](2[SPACE]CUPS)"
285 PRINT"[SPACE]3.[SPACE]HEAVY[SPACE](4[SPACE]CUPS+)"
    :INPUT"(1,2,OR[SPACE]3)";J
290 IF J=2 THEN Z=Z+2
295 IF J=3 THEN Z=Z+6
300 PRINT"[RVS]DRIVING"
305 PRINT"[SPACE]1.[SPACE]20,000[SPACE]MILES[SPACE]OR
    [SPACE7]LESS[SPACE]W/SEATBELTS"
310 PRINT"[SPACE]2.[SPACE]20,000[SPACE]OR[SPACE]LESS
    [SPACE8]NO[SPACE]SEATBELTS[SPACE]WORN
```

```
315 PRINT"[SPACE]3.[SPACE]20,000+[SPACE]MILES"
    :INPUT"(1,2,OR[SPACE]3)";K
320 IF K=1 THEN Z=Z-3
325 IF K=3 THEN Z=Z+12
330 PRINT"[RVS]DRUG[SPACE]ABUSE"
335 PRINT"[SPACE]1.[SPACE]NONE",,"[SPACE]2,[SPACE]
    MODERATE","[SPACE]3.[SPACE]HEAVY"
350 PRINT"[SPACE]4.[SPACE]NARCOTICS[SPACE]"
    :INPUT"(1,2,3,OR[SPACE]4)";L
355 IF L=2 THEN Z=Z+12
360 IF L=3 THEN Z=Z+24
365 IF L=4 THEN Z=Z+36
400 PRINT"[RVS,SPACE3]FAMILY[SPACE]&[SPACE]SOCIAL[SPACE6]
    HISTORY[SPACE]INVENTORY[SPACE3]"
405 PRINT"[RVS]FATHER"
410 PRINT"[SPACE]1.[SPACE]ALIVE[SPACE]&[SPACE]OVER[SPACE]
    68"
415 PRINT"[SPACE]2.[SPACE]UNDER[SPACE]68[SPACE]&[SPACE]
    ALIVE,[SPACE5]OR[SPACE]DEAD[SPACE]AT[SPACE]68+"
420 PRINT"[SPACE]3.[SPACE]DEAD[SPACE]OF[SPACE]MEDICAL
    [SPACE7]CAUSES[SPACE]UNDER[SPACE]68"
    :INPUT"(1,2,OR[SPACE]3)";M
425 IF M=1 THEN Z=Z-3
430 IF M=3 THEN Z=Z+3
435 PRINT"[RVS]MOTHER"
440 PRINT"[SPACE]1.[SPACE]ALIVE[SPACE]&[SPACE]OVER[SPACE]
    73"
445 PRINT"[SPACE]2.[SPACE]ALIVE[SPACE]&[SPACE]UNDER[SPACE]
    68,[SPACE5]OR[SPACE]DEAD[SPACE]AT[SPACE]68+"
450 PRINT"[SPACE]3.[SPACE]DEAD[SPACE]OF[SPACE]MEDICAL
    [SPACE7]CAUSES[SPACE]UNDER[SPACE]73"
    :INPUT"(1,2,OR[SPACE]3)";N
455 IF N=1 THEN Z=Z-3
460 IF N=3 THEN Z=Z+3
465 PRINT"[RVS]MARITAL[SPACE]STATUS"
470 PRINT"[SPACE]1.[SPACE]SINGLE",,"[SPACE]2.[SPACE]
    MARRIED"
475 PRINT"[SPACE]3.[SPACE]UNMARRIED[SPACE]&[SPACE]OVER
    [SPACE6]40":INPUT"(1,2,OR[SPACE]3)";O
480 IF O=3 THEN Z=Z+6
485 PRINT"[RVS]RESIDENCE"
490 PRINT"[SPACE]1.[SPACE]IN[SPACE]LARGE[SPACE]CITY","
    [SPACE]2.[SPACE]IN[SPACE]SUBURB"
500 PRINT"[SPACE]3.[SPACE]FARM[SPACE]OR[SPACE]SMALL[SPACE]
    TOWN":INPUT"(1,2,OR[SPACE]3)";P
505 IF P=1 THEN Z=Z+6
510 IF P=3 THEN Z=Z-3
```

```
530 PRINT"[RVS,SPACE2]PHYSICAL[SPACE]INVENTORY[SPACE2]"
535 PRINT"[RVS]WEIGHT[RVOFF],[SPACE]THINK[SPACE]OF[SPACE]
    YOUR[SPACE]'IDEAL'[SPACE]WEIGHT[SPACE]AT[SPACE]AGE
    [SPACE]20"
540 PRINT"[SPACE]1.[SPACE]SAME[SPACE]NOW,[SPACE]OR[SPACE]
    GAIN[SPACE5]OF[SPACE]LESS[SPACE]THAN[SPACE]10[SPACE7]
    LBS."
545 PRINT"[SPACE]2.[SPACE]20[SPACE]LBS.[SPACE]OVER"
550 PRINT"[SPACE]3.[SPACE]40[SPACE]LBS.[SPACE]OR[SPACE]
    MORE":INPUT"(1,2,OR[SPACE]3)";Q
555 IF Q=1 THEN Z=Z-3
560 IF Q=2 THEN Z=Z+6
565 IF Q=3 THEN Z=Z+15
570 PRINT"[RVS]BLOOD[SPACE]PRESSURE"
575 PRINT"[SPACE]1.[SPACE]UNDER[SPACE]40[SPACE]YRS.[SPACE]
    &[SPACE7]ABOVE[SPACE]130/80"
580 PRINT"[SPACE]2.[SPACE]OVER[SPACE]40[SPACE]YRS.[SPACE]
    &[SPACE8]ABOVE[SPACE]140/90"
585 PRINT"[SPACE]3.[SPACE]NEITHER"
    :INPUT"(1,2,OR[SPACE]3)";R
590 IF R=2 THEN Z=Z+12
595 IF R=1 THEN Z=Z+12
600 PRINT"[RVS]CHOLESTEROL"
605 PRINT"[SPACE]1.[SPACE]UNDER[SPACE]40[SPACE]YRS.[SPACE]
    &[SPACE7]ABOVE[SPACE]220"
610 PRINT"[SPACE]2.[SPACE]OVER[SPACE]40[SPACE]YRS.[SPACE]
    &[SPACE8]ABOVE[SPACE]250"
615 PRINT"[SPACE]3.[SPACE]NEITHER"
    :INPUT"(1,2,OR[SPACE]3)";S
620 IF S=1 THEN Z=Z+6
625 IF S=2 THEN Z=Z+6
630 PRINT"[RVS]HEART
635 PRINT"[SPACE]1.[SPACE]HEART[SPACE]MURMUR"
640 PRINT"[SPACE]2.[SPACE]MURMUR[SPACE]W/HISTORY[SPACE6]
    OF[SPACE]RHEUMATIC[SPACE10]FEVER"
645 PRINT"[SPACE]3.[SPACE]NEITHER"
    :INPUT"(1,2,OR[SPACE]3)";T
650 IF T=1 THEN Z=Z+24
655 IF T=2 THEN Z=Z+48
1000 PRINT"[RVS]REG.[SPACE]MEDICAL[SPACE]CHECKUP"
1005 PRINT"[SPACE]1.[SPACE]COMPLETE","[SPACE]2.[SPACE]
     PARTIAL"
1015 PRINT"[SPACE]3.[SPACE]NO":INPUT"(1,2,OR[SPACE]3)";Y
1020 IF Y=1 THEN Z=Z-12
1025 IF Y=2 THEN Z=Z-6
1500 PRINT"[RVS,SPACE]YOUR[SPACE]MEDICAL[SPACE]AGE[SPACE6]
     IS:[RVOFF]";(Z/12)+A:END
```

Timed Typing for the Commodore 64

by Dean Rossa

The user chooses to take a one-minute or three-minute timed typing test. The microcomputer clock is set and the keyboard permits entry for one or three minutes. The program figures the number of words typed per minute and permits the user to review his typing for errors. A tone sounds after 75 characters per line are entered to remind the user to hit RETURN. A string length error occurs if more than 255 characters are entered before a return. The speed of typists on old Commodores may be cut by reaching for punctuation keys in nonstandard typewriter position.

Because it offers the challenge of beating an old record or because it offers a concrete measure of ability, both young and old students, typists and nontypists seem to enjoy the program. **C**

Timed Typing

```
10 CLR: POKE 59468,12 :K=1 :PRINT"[CLEAR]"  :DIM B$(50)
20 PRINT"THIS[SPACE]PROGRAM[SPACE]LETS[SPACE]YOU[SPACE]
   ENTER[SPACE]LINES"
30 PRINT"FROM[SPACE]THE[SPACE]PET[SPACE]KEYBOARD[SPACE]
   FOR[SPACE]1[SPACE]OR[SPACE]3[SPACE]MINUTES."
40 PRINT"IT[SPACE]THEN[SPACE]TELLS[SPACE]YOU[SPACE]YOUR
   [SPACE]TYPING[SPACE]SPEED"
50 PRINT"AND[SPACE]PERMITS[SPACE]YOU[SPACE]TO[SPACE]
   REVIEW[SPACE]FOR[SPACE]ERRORS."
60 PRINT"END[SPACE]EACH[SPACE]LINE[SPACE]WITH[SPACE]A
   [SPACE]RETURN.": PRINT
70 INPUT"ENTER[SPACE,RVS]1[RVOFF,SPACE]OR[SPACE,RVS]3
   [RVOFF,SPACE]FOR[SPACE]LENGTH"; LG
   :IF LG<>1 AND LG<>3 THEN 70
80 ET$="000100": IF LG=3 THEN ET$="000300"
90 PRINT:PRINT:PRINT"PRESS[SPACE2,RVS]RETURN[RVS,SPACE2]
   TO[SPACE]START"
100 PRINT"WHEN[SPACE]SCREEN[SPACE]CLEARS[SPACE]TIMING
    [SPACE]WILL[SPACE]START"
110 GET X$:IF X$=""THEN 110
120 IF ASC(X$)><13 THEN 110
130 POKE 59468,14: PRINT"[CLEAR]":PRINT"[DOWN,RIGHT]";
    :  TI$="000000"
140 GET X$:  IF TI$> ET$ THEN 200
150 IF X$=""THEN 140
160 IF ASC(X$)=13 THEN K=K+1:GOTO 190
170 IF ASC(X$)=17 OR ASC(X$)=145 THEN  140
180 B$(K)=B$(K)+X$  :IF LEN(B$(K))=75 THEN GOSUB 500
190 PRINT"[LEFT]"X$ "[RVS,SPACE,RVOFF]" ;:GOTO 140
```

```
200 PRINT"[CLEAR]YOUR[SPACE]TIME[SPACE]IS[SPACE]UP"
    : GOSUB 500
210 IF LEN(B$(K))=0 THEN K=K-1
220 REM DELAY A LITTLE IN CASE TYPIST ISN'T WATCHING
230 FOR I=1 TO 10
240 PRINT"********************[LEFT20]";:FOR J=1 TO 100
    :NEXT
250 PRINT"[SPACE20,LEFT20]";:FOR J=1 TO 100:NEXT
260 NEXT I  : PRINT
270 REM CLEAR ANY UNUSED STUFF OUT OF INPUT BUFFER
280 FOR I=1 TO 20:GET X$:NEXT I  : POKE 59468,12
290 PRINT:PRINT"IN[SPACE]"LG "[SPACE]MINUTES[SPACE]YOU
    [SPACE]TYPED";K;"[SPACE]LINES."
300 N=0:FOR I=1 TO K:N=N+LEN(B$(I)):NEXT I
310 PRINT"TOTAL[SPACE]NUMBER[SPACE]OF[SPACE]CHARACTERS
    [SPACE]TYPED:[SPACE]";N
320 PRINT:PRINT"WORDS[SPACE]PER[SPACE]MINUTE
    :[SPACE17]";N/(5*LG)
330 J=1
340 PRINT:PRINT:PRINT:PRINT
350 PRINT"PRESS[SPACE,RVS]R[RVOFF,SPACE]TO[SPACE]REVIEW
    [SPACE]TEXT[SPACE]5[SPACE]LINES[SPACE]AT[SPACE]A
    [SPACE]TIME"
360 PRINT"PRESS[SPACE,RVS]Q[RVOFF,SPACE]TO[SPACE]QUIT"
370 GET X$:IF X$><"R"AND X$><"Q"THEN 370
380 IF X$="Q"THEN STOP
390 M=J+4:IF M>K THEN M=K
400 PRINT"[CLEAR]" :POKE 59468,14
410 FOR I=J TO M: PRINT B$(I):PRINT: NEXT I
420 J=J+5:IF J>K THEN J=1:PRINT:PRINT"LAST[SPACE]ENTERED
    [SPACE]LINE[SPACE]<<<<<<<"
430 GOTO 340
500 FOR I=1 TO 10:POKE 59467,16:POKE 59466,15
    :POKE 59464,10:POKE 59464,0:NEXT:RETURN
65535 REM ************** PROGRAM WRITTEN BY R. ROSSA AND D
      . ROSSA ************
```

Musical Mosaic for the Unexpanded VIC 20

by W. Anne Phillips

```
5 REM SET VALUES FOR P AND K FOR DIFFERENT  MEMORY CONFIG
  URATIONS
10 P=256*PEEK(648):S2=36875:POKE S2+4,76:POKE S2+3,15
   :K=30720:IF PEEK(648)=16 THEN K=33792
19 REM SET VALUES FOR MUSICAL NOTES
20 T(1)=191:T(2)=195:T(3)=201:T(4)=207:T(5)=209:T(6)=215
   :T(7)=219:T(8)=223:T(9)=225
30 T(10)=228:T(0)=0:GOSUB 200:POKE S2+4,8:PRINT"[CLEAR]"
39 REM CHOOSE SCREEN  LOCATION
40 X=INT(RND(1)*11):Y=INT(RND(1)*11):IF Y<X THEN 40
49 REM CHOOSE CHARACTER AND COLOR
50 M=INT(RND(1)*2)*128+127:C=INT(RND(1)*8)
59 REM CALCULATE LOCATIONS OF REFLECTIONS OF CHOSEN LOCAT
   ION
60 P(1)=P+22*Y+X:P(2)=P+22*X+Y:P(3)=P+22*X+21-Y
   :P(4)=P+22*Y+21-X
65 P(5)=P+22*(21-Y)+21-X:P(6)=P+22*(21-X)+21-Y
   :P(7)=P+22*(21-X)+Y:P(8)=P+22*(21-Y)+X
69 REM CALCULATE CORRECT CHARACTER FOR THAT LOCATION
70 FOR I=1 TO 6:M(I)=-(M=127)*255-(M=255)*127:M(I+2)=M
   :IF I=2 THEN I=4
75 NEXT
79 REM CUT CORNERS OFF DESIGN
80 IF X+Y<5 THEN FOR I=1 TO 8:M(I)=32:NEXT
89 REM MAKE SOUND AND DRAW CHARACTER
90 POKE S2,T(Y):POKE S2+1,T(Y):FOR I=1 TO 8:POKE P(I)+K,C
   :POKE P(I),M(I):NEXT
99 REM SEE IF ANY FUNCTION KEY HAS BEEN PRESSED
100 GET A$:IF A$=CHR$(133)THEN B=INT(RND(1)*8)
    :POKE S2+4,17*B+8:REM CHANGE COLOR IF F1
110 IF A$=CHR$(134)THEN S=-(S=0):POKE S2+3,-15*(S=0)
    :REM CHANGE SOUND MODE IF F3
120 IF A$=CHR$(135)THEN PRINT"[CLEAR]"
    :REM CLEAR SCREEN IF F5
130 IF A$=CHR$(136)THEN POKE S2,0:POKE S2+1,0:GOTO 150
    :REM FREEZE IF F7
140 GOTO 40
150 GET A$:IF A$=""THEN 150
160 IF A$=CHR$(136)THEN 40:REM UNFREEZE IF F1 HIT AGAIN
170 GOTO 150
```

```
200 PRINT"[CLEAR,RIGHT4,BLACK,RVS]MUSICAL[SPACE]MOSAIC
    [RVOFF]":PRINT"[RIGHT3,DOWN]BY[SPACE]ANNE[SPACE]
    PHILLIPS":REM INSTRUCTIONS
210 PRINT"[DOWN3,RVS]F1[RVOFF,SPACE]CHANGES[SPACE]
    BACKGROUND[SPACE4]COLOR":PRINT"[DOWN,RVS]F3[RVOFF,
    SPACE]SWITCHES[SPACE]SOUND[SPACE]ON[SPACE]&[SPACE3]
    OFF"
220 PRINT"[DOWN,RVS]F5[RVOFF,SPACE]CLEARS[SPACE]SCREEN
    [SPACE]AND[SPACE5]BEGINS[SPACE]NEW[SPACE]MOSAIC"
230 PRINT"[DOWN,RVS]F7[RVOFF,SPACE]FREEZES[SPACE]&[SPACE]
    RE-STARTS[SPACE3]MOSAIC"
240 PRINT"[DOWN3,RVS,RIGHT2]HIT[SPACE]A[SPACE]KEY[SPACE]
    TO[SPACE]START"
250 GET A$:IF A$=""THEN 250
260 RETURN
```

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Two Programs for the VIC 20 and *Super Expander* Cartridge

by Robert Mock

Super Expander Box Design

```
10 GRAPHIC1
20 COLORINT(RND(1)*16),INT(RND(1)*8),INT(RND(1)*8),INT(RND(1)*16)
21 FORT=1TO50
22 IFRCOLR(1)=RCOLR(2)THEN20
24 IFRCOLR(3)=RCOLR(4)THEN20
26 C=INT(RND(1)*3)
30 J=INT(RND(1)*1023)
40 DRAWC,511,0+JTO1023-J,511TO511,1023-JTO0+J,511TO511,0+J
50 IFPEEK(197)=33THEN20
60 NEXTT
70 IFPEEK(197)=33THEN20
80 GOTO10
```

Super Expander Diamond Design

```
10 GRAPHIC1
20 COLORINT(RND(1)*16),INT(RND(1)*8),INT(RND(1)*8),INT(RND(1)*16)
30 FORT=1TO50
40 IFRCOLR(1)=RCOLR(2)THEN20
50 IFRCOLR(3)=RCOLR(4)THEN20
60 C=INT(RND(1)*3)
70 J=INT(RND(1)*974)
80 DRAWC,50+J,50+JTO50+J,974-JTO974-J,974-JTO974-J,50+JTO50+J,50+J
85 IFPEEK(197)=33THEN20
90 NEXT
100 GOTO10
```

Revised Version of VICTERM PRINT

by Jim Gracely

This is the revised version of the VICTERM PRINT program that appeared in the Spring, 1983, *Power/Play* (Vol. 2, No. 1). With your VICMODEM and Commodore 64 or VIC 20 with 8K expander, you can use the program to save sequential files (text) from any telecommunications network and print the files to screen or printer.

This program may be used with any of the following machines:

VIC 20 with 8K expansion—buffer size: 5124 bytes
VIC 20 with 16 K expansion—buffer size: 13316 bytes
Commodore 64—buffer size: 32600 bytes

It will automatically determine the machine being used and will adjust the top and bottom of the buffer accordingly.

The following section provides a brief description of each function key:

F1—Control C
This creates an immediate interrupt of data transmission and will return you to the exclamation prompt (!).

F3—Control S
This will stop transmission of data *after* the RS-232 buffer is emptied (up to 256 bytes after the F3 is pressed). A Control S is automatically sent when the available program buffer space is filled.

F5—Control Q
This will restart transmission after a Control S has been executed.

Caution: *You must use a Control Q to restart transmission of data after the program buffer has been filled.*

F7—Escape
This tells the host computer (CompuServe etc.) to repeat the last command prompt (will not work at the exclamation prompt).

F2—User ID
This key can be used instead of typing your User ID when you log on. Replace the word "User ID" in line 22 with your User ID number.

F4—Menu
Pressing this key will display the menu. Transmission is *not* stopped and the screen will be cleared when you return to the terminal screen.

F6—Password
This key can be used instead of typing your password. Replace the word "Password" in line 22 with your password.

F8—Logoff
This key executes an OFF command and will put you back to the "Host Name" prompt.

Menu

The menu screen contains five selections for storing, printing and recording received data. The following section provides a brief description of each selection.

1. STORE RECEIVED DATA/STOP STORING DATA—This will toggle between two different messages. When the buffer is closed the "Store Received Data" message is displayed. When the buffer is open, the "Stop Storing Data" message is displayed along with a "(bytes used)/(buffer size)" message. The number of bytes used is not affected by opening and closing the buffer. You can open the buffer to store some data, close it and open it to store additional data without destroying the original data.

2. PRINT FROM MEMORY—This will print out the data currently stored in the buffer. The buffer can be open or closed.

3. RECORD FROM MEMORY—This will record the data currently stored in the buffer. Before the data is recorded, two prompts will ask for the device being used (tape or disk) and the name of the file. The buffer can be open or closed.

4. CLEAR BUFFER—This will clear the buffer. The buffer can be open or closed.

5. END—This will close the RS-232 channel and end the program.

Pressing RETURN while the menu is displayed will return to the terminal screen.

Because this program is written in BASIC, it is important to tell the host computer to send delays after each carriage return. To do this on CompuServe use the following procedure:

1. At the exclamation prompt (!) type EXI. The terminal will respond with "OK"
2. Type TER CRD 20. This is TERminal CaRriage Delay 20.
3. When the terminal again responds with "OK" you can use any command allowed at an exclamation prompt, or you can type EXI to return to CIS-1 (CompuServe main menu page).

This precaution will eliminate the garbled and blank characters that would otherwise occasionally appear on the screen.

We hope that many of you who have struggled with this program for so long will finally be able to sit down and enjoy it. **C**

VICTERM Print

```
10 OPEN 5,2,3,CHR$(6)
11 P=PEEK(56)
12 IF P=158 THEN MB=5800:GOTO 20
13 IF P=62 THEN MB=8700:GOTO 20
14 IF P=94 THEN MB=8700
20 MT=(P-8)*256:RT$=CHR$(13):DA=MB:PT=DA
22 ID$="USER[SPACE]ID":PA$="PASSWORD":OF$="OFF"
25 B$(1)="[SPACE]STORE[SPACE]RECEIVED[SPACE]DATA"
   :B$(2)="[SPACE]STOP[SPACE]STORING[SPACE]DATA":B$=B$(1)
30 PRINT CHR$(142)"[CLEAR,DOWN,SPACE3,RVS,SPACE16,RVOFF]
   "RT$"[SPACE3,RVS,SPACE]VIC[SPACE]TERM[SPACE]PRINT
   [SPACE]"
40 PRINT"[SPACE3,RVS,SPACE16,RVOFF]"RT$"[DOWN4,SPACE]
   MODIFIED[SPACE]BY"RT$"[DOWN2,SPACE3]JIM[SPACE]GRACELY"
50 PRINT"[DOWN,SPACE8]AND"RT$"[DOWN,SPACE3]TONY[SPACE]
   CARAMANICO"
110 PRINT"[DOWN5,RVS]SETTING[SPACE]UP...."
120 DIM F%(255),T%(255):FOR J=32 TO 64:T%(J)=J:NEXT
130 T%(13)=13:T%(20)=8:RV=18:CT=0
140 FOR J=65 TO 90:T%(J)=J+32:NEXT
150 FOR J=91 TO 95:T%(J)=J:NEXT
160 FOR J=193 TO 218:T%(J)=J-128:NEXT
170 T%(133)=3:T%(134)=19:T%(135)=17:T%(136)=27
180 FOR J=0 TO 255:K=T%(J)
190 IF K<>0 THEN F%(K)=J:F%(K+128)=J
195 NEXT
200 PRINT"[CLEAR,DOWN]FUNCTIONS:"RT$"[DOWN]F1[SPACE]=
    [SPACE]CTRL[SPACE]C"RT$"[DOWN]F2[SPACE]=[SPACE]YOUR
    [SPACE]USER[SPACE]ID"RT$"[DOWN]F3[SPACE]=[SPACE]CTRL
    [SPACE]S
```

```
210 PRINT"[DOWN]F4[SPACE]=[SPACE]MAIN[SPACE]MENU"RT$"
    [DOWN]F5[SPACE]=[SPACE]CTRL[SPACE]Q"RT$"[DOWN]F6
    [SPACE]=[SPACE]YOUR[SPACE]PASSWORD"
215 PRINT"[DOWN]F7[SPACE]=[SPACE]<ESCAPE>"RT$"[DOWN]F8
    [SPACE]=[SPACE]LOGOFF"
220 PRINT"[DOWN,RVS]PRESS[SPACE]ANY[SPACE]KEY[UP2]":GET A$
    :IF A$=""THEN 220
230 PRINT"[CLEAR,SPACE4]TERMINAL[SPACE]OPEN"RT$"[DOWN,
    SPACE4]VIC[SPACE]TO[SPACE]ASCII"CHR$(14)
240 GET A$:IF A$<>""THEN 290
245 GET#5,A$:IF A$=""THEN 335
250 A=ASC(A$+CHR$(0)):IF MS$="OPEN"THEN POKE DA,A:DA=DA+1
    :IF DA=MT THEN 365
260 PRINT"[SPACE]"CHR$(157)CHR$(F%(A));
270 IF A=34 THEN POKE 212,0
280 GOTO 240
290 A=ASC(A$+CHR$(0))
295 IF A=137 THEN PRINT#5,ID$:GOTO 360
300 IF A=139 THEN PRINT#5,PA$:GOTO 360
310 IF A=140 THEN PRINT#5,OF$:GOTO 360
320 IF A=138 THEN 440
325 IF A=133 THEN POKE 667,PEEK(668):PRINT#5,CHR$(T%(A));
    :GOTO 240
327 IF A=20 AND MS$="OPEN"THEN DA=DA-2:IF DA<MB THEN DA=MB
330 IF A<>0 THEN PRINT#5,CHR$(T%(A));
335 PRINT CHR$(RV)"[SPACE]"CHR$(157)CHR$(146);
340 CT=CT+1
350 IF CT=6 THEN CT=0:RV=164-RV:F=FRE(X)
360 A$="":GOTO 240
365 MS$="CLOSED":B$=B$(1)
366 PRINT#5,CHR$(19);
367 PRINT"[CLEAR,RVS]***BUFFER[SPACE]FULL***"
    :FOR Z=1 TO 900:NEXT
369 GOTO 470
380 IF DA=MB THEN PRINT"[CLEAR,RVS]NO[SPACE]DATA[SPACE]IN
    [SPACE]BUFFER":GOTO 470
382 OPEN 4,4,7:PRINT#4,RT$RT$
383 PRINT"[CLEAR,DOWN4,SPACE3]PRINTING[SPACE]MEMORY"
    :FOR PT=MB TO DA-1
390 PRINT#4,CHR$(F%(PEEK(PT)));:NEXT:PRINT#4,RT$RT$
    :CLOSE 4:GOTO 440
400 IF DA=MB THEN PRINT"[CLEAR,RVS]NO[SPACE]DATA[SPACE]IN
    [SPACE]BUFFER":GOTO 470
```

```
405 PRINT"[CLEAR,DOWN2]WHAT[SPACE]IS[SPACE]THE[SPACE]FILE
    [SPACE]NAME":INPUT F$
407 PRINT"[DOWN]ARE[SPACE]YOU[SPACE]USEING[SPACE,RVS]T
    [RVOFF]APE[SPACE]OR[SPACE,RVS]D[RVOFF]ISK":INPUT A$
408 IF LEFT$(A$,1)="D"THEN OPEN 1,8,5,F$+",S,W":A$="DISK"
    :GOTO 415
410 IF LEFT$(A$,1)="T"THEN OPEN 1,1,1,F$:A$="TAPE"
    :GOTO 415
412 GOTO 440
415 FOR PT=MB TO DA
420 PRINT#1,CHR$(F%(PEEK(PT)));:NEXT:PRINT#1,CHR$(92)
    :PRINT#1,CHR$(92)
430 PRINT"[CLEAR]CLOSING[SPACE]"A$"[SPACE]FILE":CLOSE 1
    :FOR Z=1 TO 900:NEXT
440 PRINT CHR$(142)CHR$(147);
470 PRINT"[DOWN3]OPTIONS[SPACE]ARE:[DOWN]"
480 PRINT"[DOWN2]1.";B$"[SPACE2]";
    :IF MS$="OPEN"THEN PRINT DA-MB"/"MT-MB;
490 PRINT:PRINT"[DOWN]2.[SPACE]PRINT[SPACE]FROM[SPACE]
    MEMORY"RT$"[DOWN]3.[SPACE]RECORD[SPACE]FROM[SPACE]
    MEMORY"
491 PRINT"[DOWN]4.[SPACE]CLEAR[SPACE]BUFFER"RT$"[DOWN]5.
    [SPACE]END"
500 PRINT"[DOWN2]YOUR[SPACE]CHOICE[SPACE](RETURN[SPACE]TO
    [SPACE]CONTINUE):"
510 GET A$:IF A$=CHR$(13)THEN 200
515 IF A$<"1"OR A$>"5"THEN 510
520 ON VAL(A$)GOTO 600,380,400,540,530
530 CLOSE 2:PRINT"[CLEAR,DOWN2,SPACE2]TERMINAL[SPACE]
    CLOSED":END
540 DA=MB:PRINT"[CLEAR,DOWN6,RVS]BUFFER[SPACE]CLEAR"
    :FOR Z=1 TO 900:NEXT:GOTO 440
600 MS$="CLOSED":IF B$=B$(1)THEN MS$="OPEN":B$=B$(2)
    :GOTO 620
610 B$=B$(1)
620 PRINT"[CLEAR,DOWN7,RVS]BUFFER[SPACE]IS[SPACE]NOW
    [SPACE]";MS$:FOR Z=1 TO 900:NEXT:GOTO 440
```

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Reading the Recorded Data

This is a short program to allow you to read the data that was saved by VICTERM PRINT. The program will read data stored on either a datassette or disk drive, and will output the data to either the screen or a printer. C

VICTERM Read

```
10 PRINT"[CLEAR]WHAT[SPACE]IS[SPACE]THE
   [SPACE]FILENAME":INPUT F$
20 PRINT"[CLEAR]ARE[SPACE]YOU[SPACE]USING
   [SPACE,RVS]T[RVOFF]APE[SPACE]OR[SPACE,
   RVS]D[RVOFF]ISK":INPUT D$
30 IF LEFT$(D$,1)="D"THEN OPEN 1,8,5,F$+"
   ,S,R":GOTO 60
40 IF LEFT$(D$,1)="T"THEN OPEN 1,1,0,F$:
   GOTO 60
50 GOTO 20
60 PRINT"[CLEAR]OUTPUT[SPACE]TO[SPACE]THE
   [SPACE,RVS]S[RVOFF]CREEN[SPACE]OR[SPACE,
   RVS]P[RVOFF]RINTER":INPUT P$
70 IF LEFT$(P$,1)="S"THEN OPEN 4,3:GOTO 95
80 IF LEFT$(P$,1)="P"THEN OPEN 4,4:GOTO 100
90 GOTO 60
95 PRINT#4,"[CLEAR]"
100 GET#1,A$
110 IF A$="[POUND]"THEN 200
120 A=ASC(A$+CHR$(0)):IF A>96 THEN A=A-128
125 A$=CHR$(A)
130 PRINT#4,A$;:GOTO 100
200 CLOSE 1
210 PRINT#4:PRINT#4:CLOSE 4
220 END
```

“Deflection”

Winter, 1982 and Summer, 1983

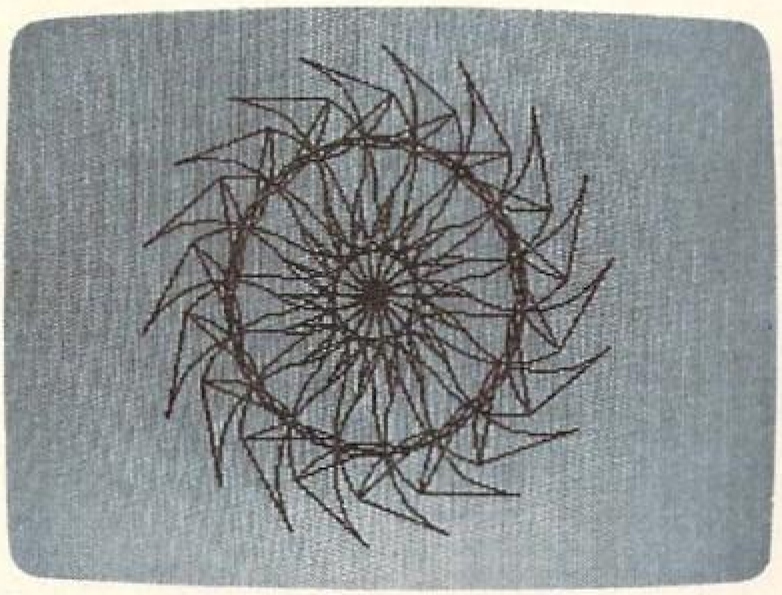
This is getting embarrassing. We already ran a fix on this game, which, we discovered, needs to be fixed. For all of you who have been frustrated by this one, we beg your forgiveness. For those of you who missed the first two versions, this game will run on any Commodore computer. **C**

```
1000 REM-->DEFLECTION #9 BY NEIL HARRIS
1050 REM CBM SS=32768:WD=80:HT=25:SE=SS+WD*HT-1
     :POKE59468,12
1051 REM PET SS=32768:WD=40:HT=25:SE=SS+WD*HT-1
     :POKE59468,12
1052 REM VIC SS=7680:WD=22:HT=23:SE=SS+WD*HT-1
     :POKE36879,24
1053 REM 64  SS=1024:WD=40:HT=25:SE=SS+WD*HT-1:POKE53281,0
1100 Z=-10:INPUT"[CLEAR,DOWN2]INSTRUCTIONS";A$
     :IF LEFT$(A$,1)="N"THEN 1400
1200 IF LEFT$(A$,1)="Y"THEN 4300
1300 Z=Z+10:GOTO 4300
1400 INPUT"[DOWN]TARGETS";A$:A=VAL(A$)
     :IF A<1 OR A>.8*WD*HT THEN Z=Z+10:GOTO 5000
1450 INPUT"[DOWN]SPEEDQ(0-9)";Q4:IF Q4<0 THEN Z=Z+10
     :GOTO 1450
1460 REM **THIS LINE FOR 64 : POKE53281,1:PRINT"[CLEAR]";
     :POKE53281,0
1470 REM **THIS LINE FOR ALL EXCEPT 64 : ?"[CLEAR]";
1500 FOR L=0 TO WD-1:POKE SS+L,96:POKE SE-L,96:NEXT L
1510 FOR L=WD TO(HT-2)*WD STEP WD:POKE SS+L,96
     :POKE SS+WD+L-1,96:NEXT L
1530 IF A>440 THEN 5700
1550 FOR L=1 TO A
1600 X=INT(RND(1)*WD*HT)+SS:IF PEEK(X)<>32 THEN 1600
1700 POKE X,102:NEXT L
1750 FOR L=SS TO SE:IF PEEK(L)<>32 THEN NEXT L
1800 P=0:T=A:P0=L:Q0=L:D=SGN(RND(2)-.5):TI$="000000"
     :IF RND(3)>.5 THEN D=WD*D
1900 NP=P0+D
2200 J=PEEK(NP):GET A$:IF J=32 THEN 3100
2225 IF J=96 THEN 5200
2250 IF J=81 THEN 5250
2300 IF J=102 THEN 3400
2350 GET A$:IF A$="Q"THEN 5100
```

```
2400 IF J=77 THEN 2800
2500 IF ABS(D)=1 THEN 2700
2600 D=-D/WD:GOTO 5250
2700 D=-WD*D:GOTO 5250
2800 IF ABS(D)=1 THEN 3000
2900 D=D/WD:GOTO 5250
3000 D=D*WD:GOTO 5250
3100 IF A$="Q"THEN 5100
3150 IF A$="/"THEN P=P+1:POKE NP,78:GOTO 1900
3200 IF A$="[POUND]"THEN P=P+1:POKE NP,77:GOTO 1900
3300 P0=NP:POKE Q0,32:FOR Q5=1 TO Q4*5:NEXT:POKE P0,81
     :Q0=P0:GOTO 1900
3400 T=T-1:IF T>0 THEN 3100
3500 PRINT"[CLEAR,DOWN2]YOU[SPACE]GOT";A;"TARGETS[SPACE]
     USING";P;"PADDLES"
3600 PRINT"[DOWN]YOUR[SPACE]TIME[SPACE]WAS[SPACE]";
     MID$(TI$,3,2);":";RIGHT$(TI$,2);"[DOWN]"
3700 R=16*LOG(A*15000/(P*P*VAL(TI$)/2))-Z-2*Q4
     :PRINT"YOUR[SPACE]RATING";R
3701 IF R<=0 THEN R=.1
3800 RESTORE:FOR L=1 TO 10-R/10:READ A$:NEXT L
3900 PRINT"...";A$
3950 IF Z>90 THEN NEW
4000 INPUT"[DOWN]ANOTHER[SPACE]GAME";A$
     :IF LEFT$(A$,1)="N"THEN END
4100 IF LEFT$(A$,1)<>"Y"THEN Z=Z+10:GOTO 3950
4200 GOTO 1400
4300 PRINT"[DOWN]THE[SPACE]OBJECT[SPACE]OF[SPACE]THE
     [SPACE]GAME"
4400 PRINT"IS[SPACE]TO[SPACE]DEFLECT[SPACE]THE[SPACE]BALL"
4450 PRINT"BALL[SPACE]THROUGH[SPACE]THE[SPACE]"
4500 PRINT"TARGETS.[SPACE]ONCE[SPACE]THE[SPACE]LAST"
4550 PRINT"TARGET[SPACE]HAS[SPACE]BEEN[SPACE]HIT"
4575 PRINT"THE[SPACE]GAME[SPACE]ENDS."
4600 PRINT"[DOWN]YOU[SPACE]DEFLECT[SPACE]THE[SPACE]BALL"
4650 PRINT"USING[SPACE]THE[SPACE,POUND,SPACE]OR[SPACE]
     [POUND][SPACE]AND[SPACE]/"
4700 PRINT"KEYS.[SPACE2]ONCE[SPACE]A"
4750 PRINT"DEFLECTOR[SPACE]IS[SPACE]CREATED"
4800 PRINT"IT[SPACE]IS[SPACE]IN[SPACE]PLACE"
4825 PRINT"PERMANENTLY."
4850 PRINT"[DOWN]SPEED[SPACE]FACTOR[SPACE]OF[SPACE]ZERO"
4875 PRINT"IS[SPACE]MAXIMUM."
4900 PRINT"[DOWN]HIT[SPACE]Q[SPACE]AT[SPACE]ANY[SPACE]TIME
```

```
4950 PRINT"TO[SPACE]QUIT"
5000 PRINT"[DOWN]YOU[SPACE]MAY[SPACE]CHOOSE[SPACE]FROM
5050 PRINT"1[SPACE]TO"INT(.8*WD*HT)"TARGETS":GOTO 1400
5100 Z=Z+20:PRINT"[CLEAR]YOU[SPACE]QUIT":GOTO 4000
5200 D=-D:P0=NP:NP=P0+D:GOTO 2200
5250 P0=NP:GOTO 1900
5500 DATA AMAZING,PROFESSIONAL,"VERY[SPACE]GOOD",FAIR,
     "KEEP[SPACE]PRACTICING","TRY[SPACE]HARDER"
5600 DATA WIMP,SPAZZ,"TRY[SPACE]A[SPACE]DIFFERENT[SPACE]
     GAME"
5700 FOR L=SS+WD TO SE-WD:IF PEEK(L)<>32 THEN 5900
5800 POKE L,102
5900 NEXT L
6000 FOR L=0 TO.8*WD*HT
6100 X=INT(RND(1)*1000)+32768:IF PEEK(X)<>102 THEN 6100
6200 POKE X,32:NEXT L
6300 GOTO 1750
```

LOGO MOTION.



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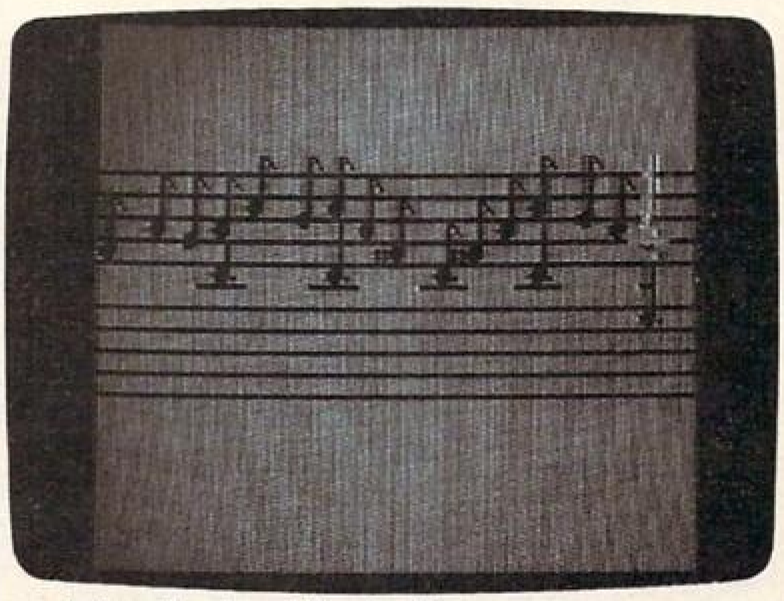

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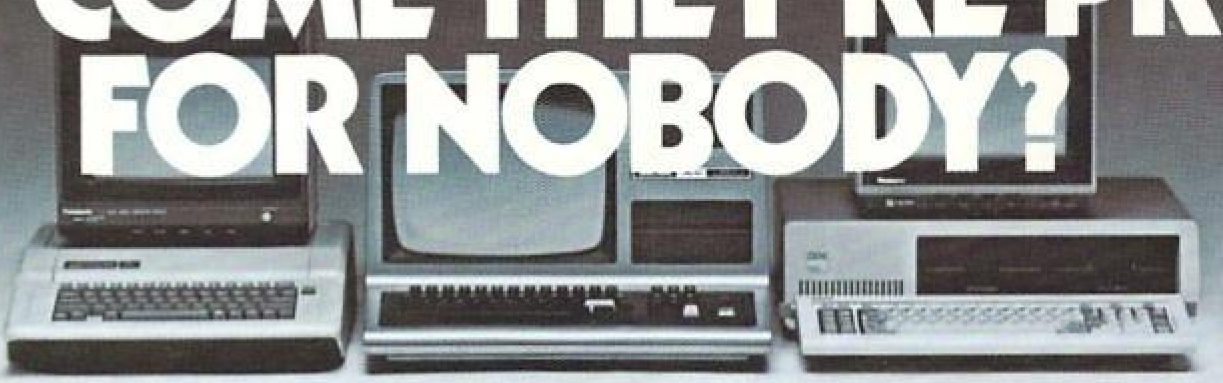

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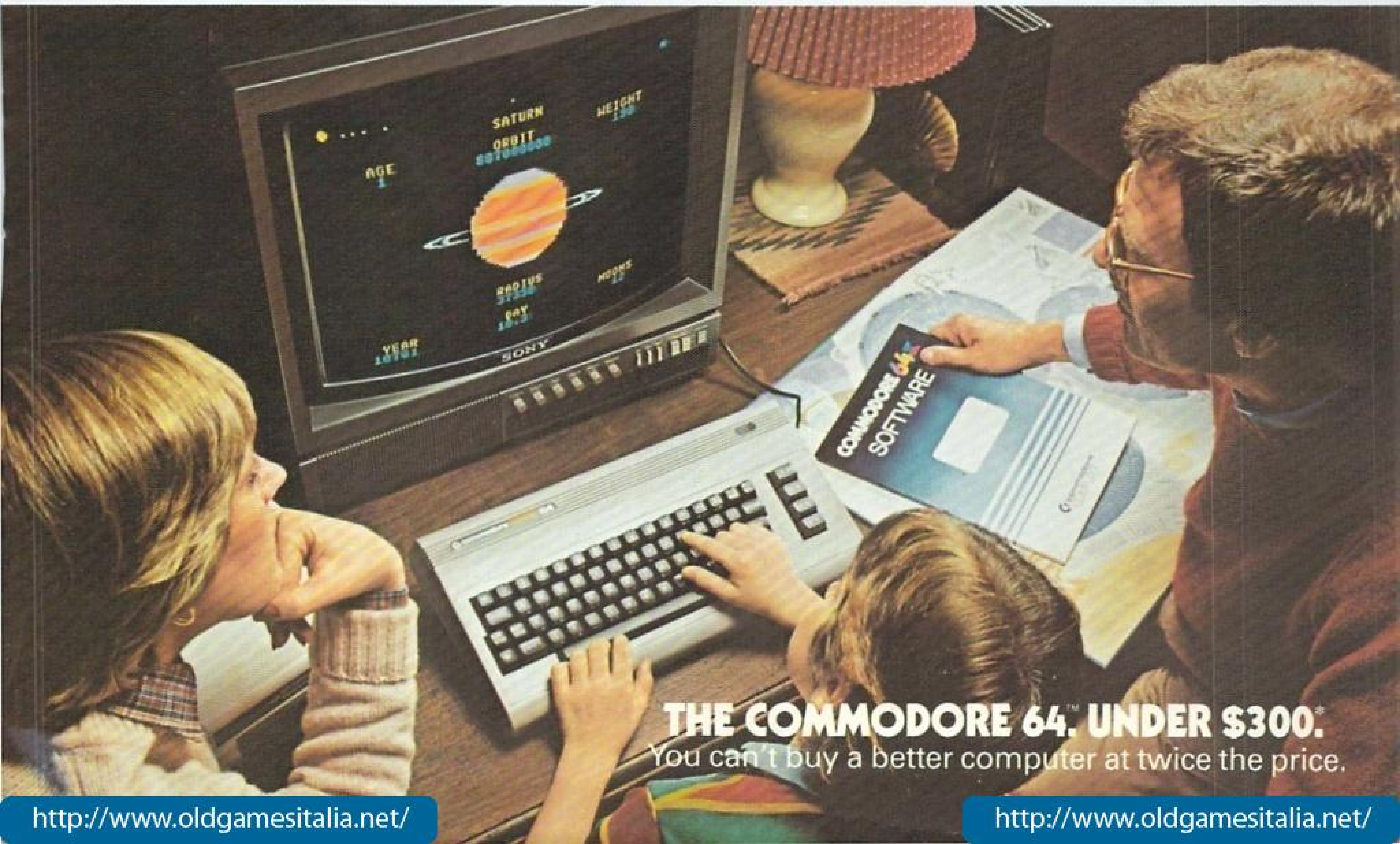

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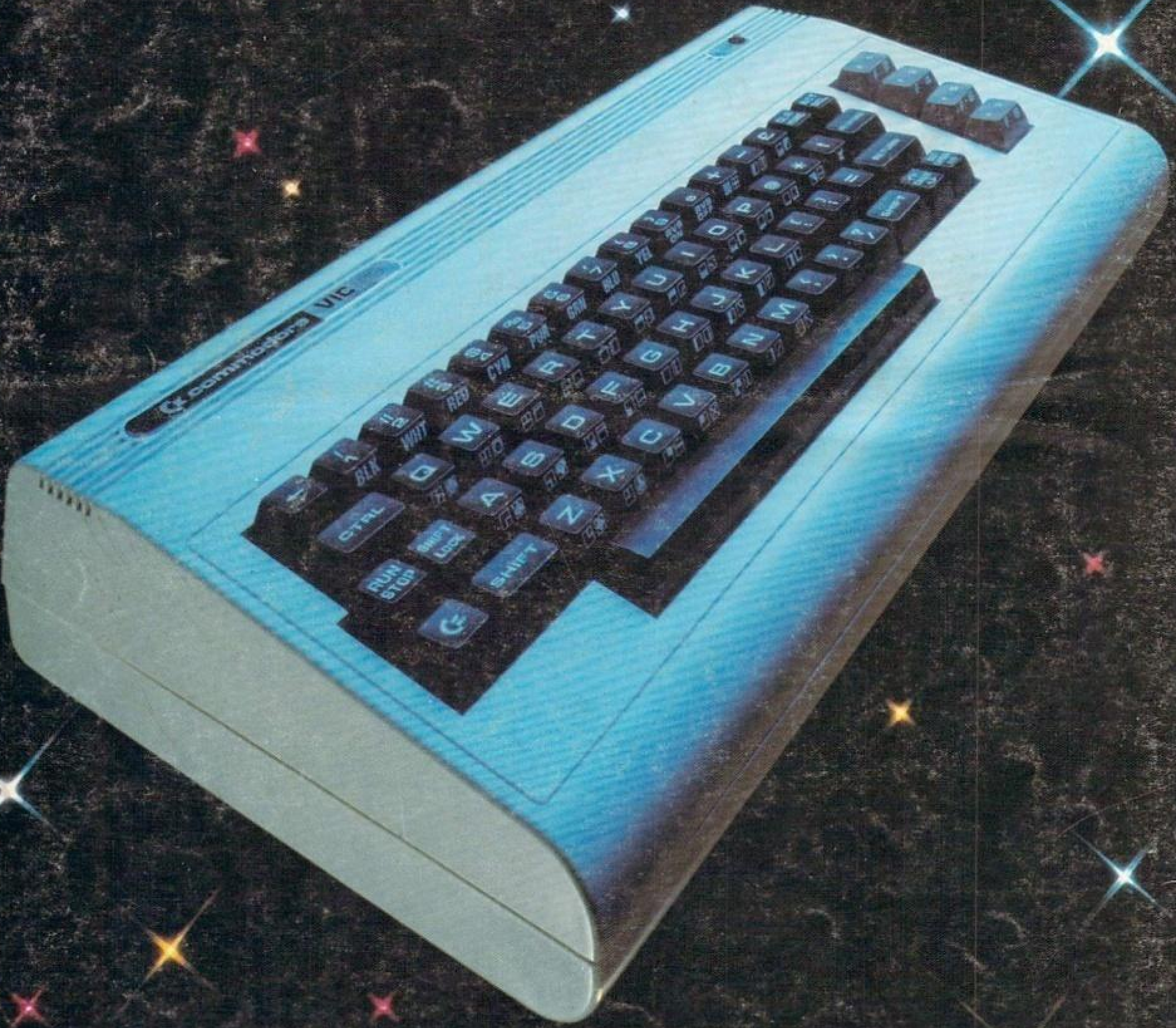
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